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Thesis

BIOLOGY AS A MEDIUM FOR GUIDANCE IN THE WORTHY USE OF LEISURE

Submitted by

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BIOLOGY AS A MEDIUM FOR GUIDANCE IN THE WORTHY USE OF LEISURE

CHAPTER 1

THE PLACE OF LEISURE-TIME GUIDANCE IN SECONDARY EDUCATION

The Need for Further Effort in Guidance for Leisure

Leisure has increased.-- The people of the United States today have more leisure at their disposal than had any previous generation in our history. As time goes on this leisure will increase for the mass of the population. The reasons for this increase as given by Lies, who made a very extensive study on the subject, are as follows:

> The tremendous development of labor-saving machinery, hitched to electric power; increased efficiency of management and of labor; motivation based upon the economic principle that more leisure means more leisure wants and that in turn means more buying and more business; acceptance of a philosophy based upon the idea that man cannot live by bread alone and that time is needed for life enrichment; and pressure by organized labor upon industry for a program involving the principle of balanced living--work and play. -- All records show that the work-day and the work-week in industry and commerce have decreased for great numbers of our workers in the last 35 years or so. Since the beginning of the factory system, hours, for hundreds of thousands, have come down from fourteen----to eight per day, and the work-week from seven----to five (days). 1/

Frank W. Hubbard, associate director of research of the National Education Association, claims that "the depression has

1/Eugene T. Lies, The New Leisure Challenges the Schools, National Recreation Association, New York, 1933, pp. 21-22

accelerated the tendency to employ adult workers who are not affected by school attendance and child labor legislation." 1/ Hence youth in the past five years has been confronted with enforced leisure to a greater degree than ever before. Hubbard further states, "For good or for evil, freedom from toil is on the increase. What will young people do with this leisure time?" 2/

The significance of leisure.-- The ways in which leisure is used are of considerable significance to the life of an individual as well as to the rise or fall of a civilization. Lies has stated the situation clearly:

> Depending upon the use made of it, leisure can degrade or elevate people. It can reduce working efficiency or increase it. It can blast careers or enhance them. It can break down health or build it. It can impoverish life or enrich it. It can stifle talents or give them room and air for blossoming. It can dirty sex or sublimate it. It can stunt skills or rear them into exhilirating satisfactions. It can nourish self-indulgence and lead on to delinquency and crime or it can stimulate neighborliness and issue in fine human service. It can breed mediocre living or stimulate rich living. It can cramp the inner urges for wholesome creative expression or release them for more and more wonderful achievement. It can becloud the horizons of the spirit or extend them into other worlds. It can bring everlasting grief or minister to continual happiness.
>
> The use of this gift of marginal time, by individual and nation, veritably involves human destiny. 3/

Henderson is reported by Douglas to have said:

> What leisure has done for the race, it may also do

1/Frank W. Hubbard, "For Idle Hands to Do." Journal of the National Education Association, Vol. 25, No.1, p. 21, Jan. 1936.

2/ibid. p. 21.

3/op. cit. p.26.

for the individual. When properly employed it is the most important source of personal growth. When improperly employed, it is the creator of idleness and vice, incompetence and degeneracy. Eight-hour laws may be, as President Eliot suggests, a positive harm. If they merely furnish a better chance to get drunk, they are a curse rather than a blessing. 1/

The danger of misguided leisure.-- The adage that "the idle mind is the devil's workshop" appears to be borne out in our modern civilization. Hubbard reports evidence of the potential dangers from misuse of leisure time by youth as follows:

> In 1925 a survey of 460 different individuals brought before the juvenile courts in Saint Paul, Minnesota, revealed that '47 per cent of the offenders belonged to gangs, while 40 per cent of the activities engaged in were with the gang.' Other careful investigators have found that 'bad companions' were contributory factors in more than 60 per cent of the cases of delinquency. 2/

President Cutten of Colgate University states that "the proper use of leisure has created every civilization which has ever existed, the improper use has killed each one in turn----. We are consequently facing the most severe moral test in which any nation has ever been subjected, and morality is the first bulwark to fall in the battle of any civilization---." 3/

Dr. John Dewey mentions machinery and the fact that "---- popular amusements and recreation have been seized upon as a means for financial profit" and that the combination of machines and commercial amusements have created "what may be

1/Aubrey A. Douglass, Secondary Education, Houghton Mifflin Company, Boston, 1927, p. 499.

2/op. cit. p. 21.

3/George B. Cutten in The Threat of Leisure, quoted by Lies, op. cit. p. 273.

truly called a crisis in our national moral life." 1/

Lies summarizes the most striking dangers from wrongly used leisure as follows:

> The archives of social work are chock-full of records revealing results of misuse of leisure, wrong choices made in the face of numerous possibilities. The clinics and hospitals, the courts, jails, reformatories, and prisons of America deal with thousands of human maladies that go back directly or indirectly to wrong use of the free time which was at the disposal of the people involved to do with as they saw fit. Here is misery and social disaster a-plenty. 2/

Mallery states:

> For ten post-war years Americans were like beggars sitting on bags of gold. At the end the hospitals of the country contained more people suffering from mental troubles than from physical disease. Why was this? The off-time of the average person was misspent and misused. Tense, exciting, exhausting, expensive pleasures were the fashion. 3/

The value of leisure well-used.--- In spite of the dangers cited, the picture is not wholly discouraging. One should consider not simply the dire prospects of misuse of leisure but the bright future awaiting the nation if leisure be wisely used. Lies quotes Joy Elmer Morgan as follows:

> What new heights may the race not reach if one generation of teachers can guide one generation of children to meet the challenge of leisure with eager search for higher values? 4/

Leisure means new opportunities for self-improvement and

1/Quoted by Lies, op. cit. p. 272.

2/ibid. p. 27.

3/Otto T. Mallery, "Education for Leisure," Journal of National Education Association, Vol. 24, No. 9, p. 273, December 1935.

4/Joy Elmer Morgan, editorial in the Journal of National Education Association, January 1930, quoted by Lies, op. cit. p. 275.

wholesome recreation. Most of the great advancements in human welfare have been conceived or perfected during leisure hours. The Ten Commandments came to Moses on Mount Sinai. The pastoral life of David drew from him the Twenty-third Psalm. It was in a wilderness that Jesus triumphed over His temptation. The idea of the principle of gravitation is reputed to have been formulated by Newton while resting beneath a tree. Bunyan wrote Pilgrim's Progress during the enforced leisure of jail confinement as did Francis Scott Key The Star Spangled Banner. The idea of a steam engine is said to have flashed through the mind of James Watt during a Sunday afternoon stroll. The Battle Hymn of the Republic was penned by Julia Ward Howe after a carriage ride. The discoveries of Anthony Leeuwenhoek were the results of a leisure-time pursuit as was the discovery of oxygen by Joseph Priestley. Swammerdam inherited an estate which allowed him to follow his inclination for microscopic dissection. Robert Koch discovered the tuberculosis bacterium in his leisure hours. The work of Gregor Johann Mendell on inheritance was entirely the result of leisure-time experimentation. Inspirations of all sorts come to persons who have the leisure for contemplative thought and have learned to use it in so doing.

The writer does not mean to imply that all human progress comes through worthy use of leisure, but rather that the greatest heights are reached by a proper balance between work and play, tension and relaxation. This conception is supported

by Spaulding:

> Without work, leisure has no significance. Alone through learning to work by working, the only way that this is to be learned, can be laid the indispensable basis for leisure and the worthy use of leisure. 1/

What constitutes worthy use of leisure.-- From the preceding paragraphs the reader will perceive that leisure may be used to benefit the individual and society, or to harm them, or to have a neutral effect neither beneficial nor harmful. In Cardinal Principles of Secondary Education a distinction is made between worthy and unworthy uses of leisure, as follows:

> This leisure, if worthily used, will recreate his (the individual's) powers and enlarge and enrich life, thereby making him better able to meet his responsibilities. The unworthy use of leisure impairs health, disrupts home life, lessens vocational efficiency, and destroys civic-mindedness. 2/

Brewer maintains that wise use of leisure consists in the integration of life as opposed to disintegration and that there is no neutral point:

> We see on every hand men, women, and children, who have scarcely a hint of the intrinsic good of leisure. We see people who fill leisure with nothing but mental and physical futility,----. Many persons avoid leisure, others never recognize it when it appears, hosts of people require others to manage it for them, and some use it for the deadly monotony of oceans of soul-killing noise, unceasing devotion to triviality, or mere useless physical, mental and spiritual loafing." 3/

1/Frank E. Spaulding, "The Progressive Debilitation of the Secondary School, "Harvard Teachers Record, Vol. 4, no. 3, June 1934, p. 132.

2/Cardinal Principles of Secondary Education, Bulletin of the Office of Education, 1918, no. 35, Department of the Interior, Washington, D.C., P. 10.

3/John M. Brewer, Education as Guidance, The Macmillan Company, New York, 1932, p. 383.

When Spaulding says, "Developed personality employed in the service of mankind constitutes worthy living," [1] he is coming very close to defining worthily-used leisure for one can hardly live worthily without using his leisure worthily.

Douglas says, "The function of leisure is recreation and refreshment of strength and spirit after toil. [2]

How pupils spend leisure.-- On the basis of figures from the United States Office of Education cited by Lies, the average school child in America has over ten hours free time per day when he is not asleep, at meals, or in school. [3] Grumette reports an investigation into the leisure activites of pupils at the Abraham Lincoln High School in New York City as follows:

> Students spend an average of two to two and one-half hours a day turning the dials and in ninety per cent of the cases, they devote this time exclusively to listening to programs which are of an entertainment nature. (He indicates that the favorite programs were the Eno Crime Club, Sherlock Holmes, Myrt and Marge, and Eddie Cantor.)
>
> Every single one of the students goes to the movies at least once a week; many of them go twice a week, and a few as often as three times. They go to the local theater, and whatever the picture may be, they see it. (mostly trashy films listed)
>
> Few read newspapers daily but all rush for colored comic strips Sunday.
>
> ----card playing, especially among the girls, is a very popular diversion at which they spend whole afternoons and evenings.
>
> ----Only 11 girls and 4 boys of the two hundred go to either the Synagogue on Saturday or the Church on Sunday.

1/op. cit. p. 126.

2/op. cit. p. 498.

3/op. cit. p. 25.

A phrase that occurred time and again----was: "Did nothing." 1/

A recent survey reported by Hubbard indicates some of the unmet leisure-time needs of youth beyond high school age. He reports as follows:

> The items mentioned most frequently were in the following order: (a) tennis, (b) swimming, (c) boating, (d) playing golf, (e) camping, (f) caring for a flower garden. 2/

This suggests that the availability of means for participation in worthwhile leisure-time activities is an important factor in determining such activities. It would seem that students do not choose the less worthy types of leisure activities deliberately in preference to more worthy forms but rather because the former are often the only activities open to them. This is significant as indicating that the most effective guidance for leisure will be in the direction of activities which pupils will have a reasonable opportunity to follow in the near future.

The schools' responsibility in guidance for leisure.--Douglas states:

> Without training there is no guarantee that leisure will be so used (i.e. worthily). On the contrary, history shows that newly gained leisure is likely to be abused----. A part of the problem of education for the worthy use of leisure is so to train young people that they will substitute habits of harmless enjoyment for questionable or harmful amusements; a bigger problem is so to train them that leisure may be employed, not

1/Jesse Grumette, "An Investigation into the Outside-of-School Interests of First Year High School Students," High Points, February 1934, pp. 40 to 43.

2/op. cit. p. 21.

> merely in ways that are harmless, but in ways that contribute to human betterment. 1/

Thus it is seen that if the majority of young people are to use their leisure worthily then training or guidance in worthy use of leisure is necessary. Now it will be shown that the school has a responsibility in so doing.

The writer has attempted to show in the preceding pages something of the significance of leisure to society. Schools should provide that type of education most needed by society. As the public high school is the institution in America which reaches the greatest number of young people it must assume the responsibility of guiding youth to use leisure wisely if youth is to receive such guidance at all adequately. Recognizing the importance of this principle, the Commission on the Reorganization of Secondary Education in 1918 included worthy use of leisure as one of the main objectives of education. The statement of the Commission regarding the school's responsibility in leisure-time guidance follows:

> Education should equip the individual to secure from his leisure the re-creation of body, mind and spirit, and the enrichment and enlargement of his personality----. One of the surest ways in which to prepare pupils worthily to utilize leisure in adult life is by guiding and directing their leisure in youth. The school should, therefore, see that adequate recreation is provided both within the school and by other proper agencies in the community. The school, however, has a unique opportunity in this field---- that can not be furnished by other agencies. Moreover, the school can so organize recreational activities that they will contribute simultaneously to other ends of

1/op. cit. p. 498.

education,----.1/

Brewer concludes:

> If leisure-time activities are important in human welfare, and if they involve learning, then they have a valid claim upon the school and its curriculum, unless, indeed, it can be shown that other agencies are adequate to the task. However this cannot be shown; not only is guidance neglected, but false quidance in the shape of commercialized amusement, is generously provided. The schools can in no way escape the responsibility. 2/

Relationship of leisure-time guidance to other objectives of secondary education.-- The statements presented should not mislead the reader to believe that the writer considers worthy use of leisure to be the all-important aim of secondary education. Nor is it to be looked upon as a panacea for all difficulties that beset society. It is involved in the six other objectives set up by the Commission on the Reorganization of Secondary Education and the other objectives in turn impinge upon worthy use of leisure. For example, it is scarcely conceivable that one may maintain the best of health while continually using leisure wrongly and conversely, wisely-used leisure will contribute to good health.

Some educators have attached such importance to vocational guidance in the secondary school as to largely exclude avocational guidance. Yet as President Butler of Columbia University stated in his report of 1924-1925: "One hundred youths will find vocations unaided where one will know what to

1/Commission on Reorganization of Secondary Education, Cardinal Principles of Secondary Education, Bulletin, (1918) No. 35, Bureau of Education, Washington, D.C., p. 15.

2/op. cit. p. 385.

do with such leisure as he may obtain. " 1/

Leisure-time guidance may well be considered to be a form of vocational guidance because leisure pursuits not infrequently lead to vocations. Specific instances of this will be cited in a later part of this thesis which were obtained during the study. In short, emphasis placed upon guidance in the worthy use of leisure need not mean that other aims of education are to be neglected but rather that development of others will be enhanced.

The writer has stated that he does not maintain that leisure-guidance is the most important aim of education. However, he does believe it to be fully as important as any other single objective and that in spite of this importance no other objective has received less attention from teachers at large. He will portray later the situation as it exists in relation to biology teaching and point out possibilities for its improvement.

Progress made in guidance for leisure.-- The evidence points to the conclusion that so far, educators have but scratched the surface in really formulating and putting into practice programs for leisure-time guidance. Brewer indicates that present programs consist in "volunteer efforts of teachers particularly interested in extracurriculum activities.2/

Lies found that:

Only in a small number of cities visited by the

1/Nicholas Murray Butler quoted by Lies, op. cit. P. 274.
2/op. cit. p. 415.

> writer did he find that studies of the use of leisure by children had been or were being made by school authorities and usually these were along restricted lines, as for example, outside reading. 1/

Leis gives further evidence of the lack of real effort at guidance for leisure, as follows:

> Probably a hundred and fifty times in the last year and a half the writer has asked this question of school superintendents and principals; 'Do you think that most of your teachers realize clearly the extent of present-day leisure, the ways in which it has come about, the increase of it that is just ahead of us, and the implications for education inherent in the situation?' Almost invariably the frank answer was, 'No.' Of course, practically all of them would know about the Cardinal Objectives of Education of the National Education Association, one of which is 'Training for the Worthy Use of Leisure,' but they haven't really come to grips with the whole proposition.' One superintendent expressed the caution not to 'blame the teachers too much because most of their training schools are not yet laying much emphasis upon the subject.'" 2/

If this be true, then the field is indeed fertile for work in the cause of leisure-time education for both teachers and pupils, yes, even of the nation at large. In reference to leisure, Superintendent Kulp of Ithaca, N. Y., has stated that, "despite the frequent illusion to this problem which is made by contemporary writers and speakers, the nation as a whole does not recognize the seriousness of the situation with which we are faced----. " 3/

1/op. cit. p. 28.

2/op. c.t. p. 18.

3/Lies, ibid. p. 34.

Suitability of Biology for Leisure-time Guidance.

Suitability shown by past contributions.-- Without detracting from the value of the study of biology in realizing other educational aims, it nevertheless has served to arouse avocational interests on the part of many individuals. Considered as the science of life and of living things, biology includes many subordinate and related sciences, every one of which has served as a leisure-time interest for one or more persons. Many contributions of great scientific importance have been outcomes of investigations started as interests of some individual and later pursued with intense avidity.

Malpighi in relating the satisfaction he realized from his discoveries said, "In performing these researches so many marvels of nature were spread before my eyes that I experienced an internal pleasure that my pen could not describe." 1/

Linnaeus spent his spare time as a youth in collecting natural-history specimens and in thinking about them. This enthusiasm continued throughout his life and lead not only to his means of livelihood but gave an impetus to taxonomy felt even to this day. The history of biology is strewn with instances such as this. Schleiden was a practicing lawyer with indifferent success but deserted it to return to natural science in which he always had been keenly interested and in the latter field achieved eminence. Audubon, Fuertes, and

1/William A. Locy, The Story of Biology, Henry Holt and Company, New York, 1925, p. 12.

Chapman were enthusiastic bird students from boyhood. When the avocation of boyhood becomes the vocation of manhood the resulting situation is usually a happy one for the individual and fortunate for society.

Present day possibilities of biology for leisure-time guidance.-- Statements of biology teachers obtained by this study show that abiding interests may be developed through the high school biology course. Alma E. Schelback of Bennett High School, Buffalo, New York says, that on their own initiative:

> Two girls became so expert in the use of the microscope that upon graduation they secured work in the Health Department,-- work of a microscopic nature-- and work involving culture raising. Their notebooks gave them the job. One boy secured work as 'boss' in the city forestry department. Another boy is one of the men in charge of the city 'Botanical Garden' workers.

H. H. Michaud of Central High School, Fort Wayne, Indiana tells of:

> A boy who took biology 4 or 5 years ago is still collecting seeds as a hobby begun in biology at that time. Two or three boys in the city are still spending all their spare time on bird hikes as a result of interest started in biology classes. William Evans-- two years out of high school-- is planning a collecting trip down the Mississippi River and south to Bermuda. Often students out of biology and out of high school come back after several years to ask about certain observations of birds, insects, flowers, etc.

Ora L. Stephens of Smith-Cotton High School, Sedalia, Missouri, states: "I have one pupil now who is doing work in taxidermy at home. A former student also learned the work and follows it as a 'hobby' at home."

Lula Van Neman of Westport High School, Kansas City, Missouri, reports:

> Two sisters spent Christmas week in Texas and brought back at least twenty samples of plants all labeled when they returned. One sophomore collected and labeled lime-stone fossils during the summer and gave a talk to the science club based upon his study after school started.

Many other teachers reported in a similar vein giving specific instances where pupils had voluntarily undertaken certain avocational activities of a biological nature as a result of interest stimulated by their biology teachers.

Joy Elmer Morgan clearly states nine ways whereby the school can educate for leisure time through its daily program. To all of these but one, a high school biology department can contribute to some extent and for one, biology is particularly well adapted, namely: "By cultivating in children a love for the out-of-doors.--appreciation of flowers, animals, landscape, sky, and stars." 1/ Others which Morgan suggests in which biology well may share are as follows:

> By introducing young people to a wide range of life interests.
>
> By teaching the use of books and libraries and developing wholesome reading appetites closely related to each of the great objectives of education and life----.
>
> By giving children an opportunity to develop hobbies in various creative fields-- gardening, mechanics, applied arts,----.
>
> By calling attention to various recreational agencies and the values which they serve-- theaters, concerts, libraries, radio, periodicals, and newspapers, museums, parks, playgrounds, travel. 2/

The thoughtful teacher will have little difficulty in

1/Joy Elmer Morgan, editorial in the Journal of the National Education Association for October 1928, as quotes by Lies, op. cit. p. 35.

2/ibid. p. 35.

devising pupil activities of a biological nature in the fields mentioned above.

The Need for a Change in Emphasis to Realize the Leisure-time Objective.

The teacher must be convinced of the value of this objective.-- The emphasis given to any phase of a subject is determined by the viewpoint of the teacher of that subject. That educators as a group do not view leisure-time guidance as a vital consideration has been brought out earlier. Lies has reached the conclusion that teaching will continue to lack vitality until teachers realize clearly the extent of the problems raised by leisure and of the possibilities for human advancement consequent upon its right use. He found that superintendents were practically unanimously agreed that teaching would be much different if teachers did have "a gripping realization of the significance of leisure." Some answered Lies further to the effect that such realization "would give them (the teachers) the long view ahead and cause 'growth everlasting'----." 1/

Unless the teacher has this viewpoint the work will not be planned with the leisure guidance aim in mind, and such desirable outcomes as may result will be accidental.

Every subject in the high school offering is liked by

1/op. cit. p. 18.

some pupils and disliked by still others. The ways and means used by the teacher in teaching the subject are determined in no small measure by the viewpoint of the teacher. It is these methods and practices used in developing a subject which determine whether it appeals to or repels pupils. Whatever may by the intrinsic value of a subject it may be made stultifying by a teacher of limited viewpoint. Likewise, however, vague may be the value of a subject, a teacher of vision and insight can make it into a living, stimulating force for worthy living on the part of students.

This is not intended to indicate that the value of a subject is of no concern, for, given the combination of subject matter of high intrinsic value together with the stimulating teacher and an ideal situation has been achieved.

Effect of leisure guidance directly proportional to carry-over value of subjects.-- High-school pupils as well as other people occupy their leisure hours in activities which interest them and appeal to them. Conversely, they avoid such activities as repel them or which offer no attraction and arouse no interest. Therefore, if a subject is to be at all effective in improving the leisure habits of pupils, it must suggest to them some ways of using leisure time and do so in a manner which arouses in the pupils a desire to participate in those activities. The teacher who has failed to show his students a single new way for them to spend their free time has failed utterly to achieve the aim of training in the worthy

use of leisure.

The teacher who alludes to possible leisure activities yet makes no effort to induce his pupils to try out such pastimeshas progressed but little further. Certain information is necessary if the pupils are to engage in avocational pursuits with a degree of success sufficient to give them pleasure. It is equally ineffective to point out pleasurable experiences to the students which they have no possibility of enjoying in the near or distant future.

On the other hand, the teacher who plans pupil activities related to his subject, uses class time for discussion of them, demonstrates necessary technique, urges pupils to try them, later checks on the pupil participation, and not infrequently leads groups in such activities, is quite apt to develop abiding avocational interests in some of his students at least.

The possibility is ever present that the teacher may develop his subject by methods which not only discourage enthusiasm and reduce interest but which even cause pupils to resolve firmly never to have anything further to do with that "forbidding stuff." They will "more likely recoil from that experience and go after the thrills that to them spell 'life,' life with a kick to it." 1/ Lies quotes Superintendent Frank Cody of Detroit as saying that, "If the school is to train youth in such fashion that throughout life spare time will be spent most wisely, thought must be given to the permanence of

1/Lies, op. cit. p. 39.

the abilities and interests which are being developed. " 1/

Frolio is more specific in his reference to the carry-over value of activities in connection with science teaching when he says:

> Science provides an opportunity for many useful and pleasurable avocations, but in order to have avocational value, science courses should employ methods that can be used after school days -- trips to industrial plants to study raw materials, processes, and finished products, and visits to museums. In the city and in the country, at the seashore, mountains, lakes, and such, abounds nature in many wonders. It the natural interest in such things has been developed and deepened by a study of biology, zoology, botany and general science, not only is there added pleasure but the door has been opened to wider interests----. 1/

It is conceivable that occasionally a teacher may unwittingly be guilty of guiding pupils toward methods of using their spare time which are less worthy than some which pupils would select if left to their own devices.

The selection and presentation of subject-matter for its carry-over value. -- Having concluded that subjects must have carry-over value in order to have leisure-guidance value also, the next step is to determine how best to develop a course in biology or in any other subject to realize its value in training for the worthy use of leisure.

Some teachers agree that the subject matter content of a course has much to do with this carry-over value. It is

1/Lies, op. cit. p. 39.

2/Francis Frolio, Improvement of the Teaching of General Science in the Junior High School, Unpublished master's thesis, School of Education, Boston University, 1931.

evident that wherever anything learned is continually used it is not forgotten, and conversely, whatever is not used is forgotten.

Douglas states this principle as follows:

> Sooner or later, unused knowledge will lapse. Every teacher knows this, although he is disposed to treat pupils as responsible at any time for material previously assigned. The teacher himself forgets. He maintains his own knowledge through using it constantly in his teaching. Even so it escapes him to some extent, so that it becomes necessary to prepare for classes. ----Details are first to fall away. The residuam is in the form of general principles, ideals, attitudes. 1/

Following this reasoning still further, whatever is used must obviously be useful or at least usable, hence anything which is to carry-over must be useful in order to be used. Therefore the subject matter should be of a practical nature wherever possible. Judd states this view as follows:

> There is nothing more fatal to mental life than the learning of solutions of problems which are wholly artificial to the pupil and not appreciated by him as having any significance either for himself or for society. On the other hand, if one can get a pupil to see that the facts of life ought to arouse his curiosity, a very large part of the difficulty in science-teaching disappears. 2/

Pupils themselves agree that the parts of courses they like best are the parts which seem most worthwhile to them.

> Adams found the most important reason (for interests in subjects), as judged by students, to be the value of the subject in life. More consideration by students of the relationship between the content of courses and its

1/Douglas, op. cit. p. 342.

2/Charles Hubbard Judd, Psychology of Secondary Education. Ginn and Company, Boston, 1927, p. 348.

use in life may stimulate a more vital interest in the subjects. 1/

Hence efforts toward motivation on the part of the teacher enters in, for frequently the background of the pupils is such that the practical value of certain topics is not apparent to them until the applications to human welfare are pointed out to them.

Interwoven with the carry-over value of subject matter is its interest-arousing value. Activities which interest a pupil seem practical to him so long as the interest lasts. Likewise, pupils will soon engage in activities in which their interest has been deeply aroused, i.e., begin to use the material whenever possible. Conversly, uninteresting subject matter never seems practical nor does the pupil voluntarily engage in it during his leisure time. Thus the teacher who gives an assignment merely so that the pupils will have something to do and not because it is vital to their comprehension of the classwork may be doing more harm than good. For example, the biology teacher who requires his pupils to learn the technical names of human bones in order to test them theron and then makes no further use of the information will find that six months later the factual knowledge is gone and the pupil remembers only the disagreeable process he went through in learning those "hard words". Impressions result in attitudes and these

1/Jesse E. Adams, "Reactions of High School Pupils to High School Subjects," School Review, XXXV, 424, (June, 1927), as quoted by Leonard V. Koos and Grayson N. Kefauver in Guidance in Secondary Schools, The Macmillan Company, New York, 1932, p. 240.

latter abide longest.

Grumette considers it the duty of teachers to:

> Teach the boy or the girl not only the three R's and a lot of stilted, useless, stuff which, in nine cases out ten he will never use; teach him how to spend the hours outside of school in a decent, profitable, enjoyable way. That is one of the most important problems of education and the teacher cannot begin to solve it until he peers behind the screen and finds out what the student does with the other four-fifths of his time when he is away from the influence of the schools. 1/

As a biology teacher of long experience Kinsey voices this conviction when he states:

> The chief end of our teaching should be the awakening of the student's interest in the living world about him. If we can convince our boys and girls that this is an interesting world in which they live, they, of their own initiative, will acquire the specific data on which our science is based together with a lasting inspiration which may lead them to extend, in later life, their acquaintance with that world. If we fail to interest them, all of the Latin names and morphologic terms, the rules of hygiene, three-to-one ratios, and other details will be forgotten after the day of the last recitation and examination. 2/

To summarize: to have carry-over, and thus leisure-guidance, value, subject matter must fulfill at least three conditions, each of which depends upon and enhances the value of the others:-

(1) It must be suited for immediate pupil use.
(2) It must be interesting to pupils.
(3) It must seem practical to pupils.

1/Grumette, op. cit. p. 43.

2/Alfred E. Kinsey, New Introduction to Biology, J.B.Lippincott Company, Chicago, 1933, p. vii.

CHAPTER II

THE PURPOSE OF THIS STUDY AND PROCEDURES USED

Purpose

To discover progressive practices to be found in given schools.-- Admitting that there is need for leisure guidance, that biology is suited for such guidance, and that a change in emphasis is necessary to realize the leisure objective, then the next step is to discover the extent to which biology teachers have modified their courses to achieve the aim of education for the worthy use of leisure. The writer has assumed that the schools wherein the most outstanding biology teaching is being done are the schools wherein the best work for education for leisure is apt to be found. If the widely-accepted aims as stated by the Committee on the Reorganization of Secondary Education have truly become the objectives of secondary schools, then the most progressive schools should be most nearly attaining the goal of training for the worthy use of leisure.

To point out steps to be taken by biology teachers to educate for worthy use of leisure.-- A study such as this should reveal practices which have proved successful in some schools and will prove suitable for use by other biology teachers. The most valuable contribution of the study thus will be to suggest ways and means for biology teachers to

improve the value of their courses in education for leisure to a greater degree than any one teacher alone would be able to do.

The Procedure Used to Make the Study.

Building the checking list.-- In building the checking list (see Appendix B) the writer was guided by the theory that any practice which adds to the interest of pupils in the subject, points out the practical applications of biology to pupils' lives, or leads pupils to participate in worthy activities having carry-over value, has leisure-guidance benefit. This includes both class room and extracurriculum phases of the viewpoint, plans, equipment, apparatus, books, requirements, methods of presentation, and other activities of the biology department represented by the person responding to the checking list.

The writer conferred with eight high school teachers of biology, two college professors of biology, five high school principals, and two college professors of secondary education, together with the students of a seminar in problems of secondary education for suggestions regarding items to include which would shed light on the problem. Text books on biology for secondary schools were consulted as well as text books dealing with extracurriculum activities, to obtain a list of possible club activities related to biology. The writer, of course, drew on his own experience as a biology teacher in high schools for

many of the items.

Selection of schools to participate.-- A letter was sent to each of the Commissioners of Education or Superintendents of Public Instruction in each of the forty-eight states and the District of Columbia asking that some informed person be designated to fill out the blank form enclosed with each letter. Each form called for a list of at least six high schools in the state which had developed outstanding biology courses, together with the name of the principal of each and the municipality in which the high school is located. Replies were received from thirty-eight states and the District of Columbia. However, only thirty-six of these replies listed any schools. The other three stated that no information was available as to what schools had developed outstanding courses in biology. Fourteen replies recommended more than six schools each and six listed less than that number of schools. A few of the replies contained statements that all of the schools listed were doing fine work in biology. On the other hand, several indicated that the respondent was not sure that the schools listed were doing out-standing work in biology but that the list represented the best systems in the state at the time. One reply from L. W. Reese, High School Supervisor for the State of Ohio, added: "I should be very pleased to have a report on the results of your study. I want to commend you for this survey you are making."

Reaching the selected schools.-- A letter was sent

with a copy of the checking list to the principal of each of the high schools listed by the several state departments. A self-addressed envelope was enclosed also. The letter stated the purpose of the survey and requested that the checking list be filled out by some informed person in the school, preferably the chairman of the biology department. When the writer examined the checking lists after their return to him he observed that the most satisfactory replies came as a rule from class room teachers of biology. In most cases, the checking lists filled out by the principals or the heads of the science departments were the least serviceable, except where these individuals also taught a biology class as part of their duties.

Extent of response.-- In all, 234 checking lists were mailed to 35 states and the District of Columbia. One hundred and thirty-four lists containing usable information were returned from thirty-four states and the District of Columbia, or fifty-seven per cent of the number sent out. Seven other schools replied, three of them stating biology had been discontinued in that school and two that it never had been offered there.

The usable checking lists were classified first by geographical areas of the United States, using the same division as was used in Bulletin, 1932, No. 17, Monograph No. 5, National Survey of Secondary Education, Office of Education, pp. 36-37. The New England and Middle Atlantic states were represented by replies from 25 schools each, the Southern states by 20,

Middle Western by 41, and Western by 23. (For the distribution of these replies according to size of schools they represent see Table 1.)

Examination of Table 1, discloses that more than half of the schools in the Middle Atlantic area supplying data for this study are large schools having an average grade enrollment of 391 or more. The reader should bear this fact in mind in interpreting the tables which follow.

Within each geographical area, schools were classified according to type of organization. Three groupings were made, the first including all the regular four-year high schools and numbering 50 replies. The second included all reogranized schools, both six-year junior-senior high schools and three-year senior high schools and numbered 71 replies. All others, 13 in all, were grouped as "unclassified" either because information was lacking concerning the type or organization or because it was a private school or junior college. For the distribution of the schools replying according to geographical area, see Table 2. The reader will note that in the Middle Western area, reogranized schools exceed regular by more than three to one, whereas in the other areas the proportions are nearly equal. Table 3 shows the distribution according to size and type of organization.

Within each of the types of organization, schools were classified according to the average grade enrollment of each. This was determined by dividing the total enrollment

Table 1

Numbers and percentages of schools of different sizes in the same and different geographical areas supplying data for this study.

Average Grade Enrollment	Numbers and Percentages of Schools Supplying data for this study.											
	New England		Middle Atlantic		Southern		Middle Western		Western		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
195 or fewer	9	36	5	20	9	45	9	22	8	35	40	30
196 to 390	9	36	5	20	6	30	17	42	4	17	41	31
391 or more	5	20	15	60	5	25	10	24	5	22	40	30
Unclassified	2	8	0	0	0	0	5	12	6	26	13	9
Total	25	19	25	19	20	14	41	31	23	17	134	100

Table 2

Numbers and percentages of schools having different types of organization in the same and different geographical areas supplying data for this study.

Type of organization	Numbers and Percentages of Schools Supplying data for this study.											
	New England		Middle Atlantic		Southern		Middle Western		Western		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Regular	12	48	11	44	11	55	8	20	8	35	50	37
Reorganized	11	44	14	56	9	45	28	68	9	39	71	53
Unclassified	2	8	0	0	0	0	5	12	6	26	13	10
Total	25		25		20		41		23		134	

Table 3

Numbers and percentages of schools of different sizes having the same or different types of organization supplying data for this study.

Average Grade enrollment	Numbers and Percentages of Schools Supplying data for this Study			
	Regular		Reorganized	
	Number	Per cent	Number	Per cent
195 or fewer	19	38	21	30
196 to 390	14	28	27	38
391 or more	17	34	23	32

by the number of grades included in the school. For purposes of tabulation, three divisions were made. The first consisted of schools having an average grade enrollment of 195 or fewer pupils, the second included those from 196 to 390, and the third group those of over 390. This division resulted in three groups of as nearly equal size as it was possible to obtain, the first and third numbering 40 schools each, and the second 41. Table 1 shows distribution of the numbers of schools of different sizes according to geographical area.

It was, of course, impossible to so group the unclassified schools. It is noteworthy also that the group of smaller-sized schools approximately represents schools in which not more than one teacher's full time is devoted to teaching biology and for the mean of the group, about one-half of the teacher's time is engaged in biology teaching. The group of medium-sized schools consists of those in which ordinarily not less than one and not more than two biology teachers will be required for the school. In the group of schools having an average grade enrollment of over 390, two teachers or more will usually be required to teach the biology classes. Obviously, this is only an approximation because the number of pupils taking biology is a percentage of the total enrollment which varies for each school.

A more detailed analysis of the distribution of schools according to size reveals that out of 134 schools sending in usable replies, only 2 have an average grade enrollment of 30

or fewer; 5 have from 31 to 60; and 8 have from 61 to 90; 5 have from 91 to 120 and 101 have 121 or more per grade as an average. Thus 75 per cent of the schools supplying data for this study have enrollments which require five sections per grade or more. 50 per cent have enrollments greater than 241 per grade which means that half the schools are large enough to consist of eight sections or more. 25 per cent have enrollments of over 480 per grade, thus requiring sixteen sections or more, on the basis of 30 pupils per section. One-tenth of the schools have over 720, and the largest of all included in this study, the James Monroe High School in New York City, has 2625 for the average grade enrollment. Hence it is evident that of the schools recommended for participation, the great majority of those responding are really large schools. This seems to indicate that the schools recommended by the different state departments were mostly large schools or that the larger schools responded to a much greater degree than the smaller schools.

Tabulation of results.-- After this it was necessary to chart the responses to each item of each checking list, summarize the responses, and tabulate the results. The significant explanatory statements added by a number of respondents have been included with the explanation of the tables wherever such statements serve to clarify or supplement the description.

CHAPTER III

THE STATUS OF LEISURE-TIME TEACHING IN BIOLOGY COURSES IN CERTAIN HIGH SCHOOLS

Extent to which Leisure-Time Teaching is Organized

The status as revealed by responses to checking-list items.-- In response to the question "Have you an organized plan for instruction in the worthy use of leisure?", 25 per cent of the schools answered, "Yes". In the New England area such response was less than half as frequent as in any other area. Thirty-two per cent of the schools having the regular type of organization and twenty-three per cent of the reorganized schools replied in the affirmative as did thirty-four per-cent in the medium-sized class, twenty-five per cent in the smallest,- and twenty per cent in the largest-size group. Replies to other items indicate that many schools which report no organized plan are doing more for leisure guidance than some of those which claim to have such a plan. Table 4 shows the percentage distribution of affirmative responses to the above question.

The Status as revealed by explanatory statements on checking list.-- Two teachers indicate that they follow the plan for leisure instruction embodied in the text-book Biology for Today by Curtis, Caldwell,and Sherman, which contains a

Table 4

Percentages of schools reporting an organized plan for instruction in the worthy use of leisure in the same and different geographical areas supplying date for this study.

Schools Supplying Data for this Study	Percentage of affirmative replies
New England	12
Middle Atlantic	28
Southern	30
Middle Western	29
Western	26
Total	25

unit "consisting of biological activities for out-of-school hours." 1/ George C. Wood, Chairman of the Department of Biology of James Monroe High School, New York City, indicates that in that high school, planned leisure teaching is limited to club activities.

C. L. Vander Bet, Head of the Biology Department of Los Angeles, California, High School, states that they plan to assign no home work over week-ends but that projects are developed at that time under supervision of teachers.

H. M. Garrett, biology instructor in Beatrice, Nebraska, High School, indicates that he had no organized plan there but in the course of study now under revision it is planned to include leisure-time activities as a definite part of the course.

Ora L. Stephens, Head of the Science Department at Smith-Cotton High School, Sedalia, Missouri, explains that much supplementary reading by pupils is encouraged "with the aim, always, to get them interested in one or more phases of the work for life."

Loula Van Neman, teacher of biology in the Westport High School, Kansas City, Missouri, enclosed with the checking-list sample outlines of units in which definite leisure-time objectives have been stated. She writes the following comment:

> Since training in use of leisure time is one of the objectives, the course has been so arranged that fully a third of the suggested exercises in the Tentative Outline for the teachers and the "Laboratory Guide" for the pupils, encourages observation of nature at first hand and outside of school time.

1/Francis D. Curtis, Otis W. Caldwell, and Nina Henry Sherman, Biology for Today, Ginn and Company, Boston, 1934, p. 5.

One fourth tends to develop hobbies and skills in collecting, mounting, building habitat, propagating, and caring for plants and animals.

One fourth creates interests and habits in looking for clippings, references, related literature, and in classifying organisms.

Possibly a fourth encourage art activities by diagrams, drawings, water coloring, and the production of landscape improvement in home grounds. Many exercises tend to increase interest and encourage the study of and participation in social and civic problems of the community.

A few biology teachers evidently have made efforts to work out a plan for guidance in the worthy use of leisure. The writer obtained the impression that such attempts have been made by comparatively few teachers even in outstanding schools and most of the plans are vague and indefinite at best. This bears out the writer's contention as previously stated, that teachers as a whole are not yet convinced of the importance of guidance for leisure or at least not sufficiently so to cause them to begin to do anything about it.

Extent to which Leisure-Time Interests of Pupils are Known to Biology Teachers.

The status as revealed by responses to checking-list items.-- To the question, "Have you any way of knowing whether the leisure habits of your pupils have improved or not since starting the course?", Sixty-five per cent answered, "Yes". Sixty-six per cent of both the regular and reorganized types of schools replied in the affirmative, as did sixty-five per-cent, seventy per cent, and sixty-two per cent respectively of the smaller -,medium-,and larger-sized schools. Table 5 shows the distribution for geographical areas where the highest

Table 5

Percentages of schools in the same and different geographical areas supplying data for this study which report knowledge that leisure habits of pupils improved during the biology course.

	Percentages of Schools Supplying Data for this study.					
	New England	Middle Atlantic	Southern	Middle Western	Western	Total
Affirmative replies.	64	68	70	68	52	65

percentage was reported from the Southern and the lowest, 52 per cent, from the Western areas.

The next item asked the respondent to select from a list of seven methods, the ones used by him to determine whether leisure habits of pupils improved or not. Table 6 shows the extent to which the different methods are used in the schools reporting.

The teachers in more than half of the schools replying infer from the specimens and clippings brought into class whether the leisure habits of their pupils are showing improvement or not. Only 6 per cent use so objective a method as a questionaire or checking list suitable for use with an entire class, yet 41 per cent report the use of personal interviews with pupils, a method which consumes far more time. The writer thus is lead to conclude that the personal interviews are for the most part limited to a relatively few pupils and are not systematically used by teachers with all pupils. The average number of methods employed per school is 2.5 for all schools with no significant variations for the different areas, sizes, or types of organization. The Middle Atlantic area is highest however, with an average of 2.9 methods whereas the Western is lowest with 2.0.

The status as revealed by supplementary statements.--

Under the heading of "other methods used", some replies were indicative of the extent of teachers' observations of pupils' activities and of possible means for learning more

Table 6

Percentages of schools supplying data for this study which use each of the different methods listed to determine improvement in leisure habits of pupils.

Methods used	Percentages of schooly supplying data for this study.
Specimens and clippings brought in by pupils	57
Personal observations out of school	48
Personal interviews with pupils at beginning and end of course	41
Reports from parents and other teachers	35
Reports on activities of pupils during vacations	33
Record of participation in related extra-curriculum activities	16
Questionnaire or checking list at beginning and end of course	6
Other methods	16

about them. Some of the more illuminating comments follow:

"Students buy science books, apparatus, etc., for themselves."

"Pupils collected materials for high school Science Museum, locally or on trips."

"Hobby show, class projects and by projects brought in."

"Interest in class hikes and reports of individual field trips."

"Reports from Boy Scouts, leaders in Scouting, and Merit Badge work."

"Many have developed life-time interests, especially in birds."

"Scrap books, application tests, hobbies, and home visitation."

"Improvement of general interest, class discussions."

"Field trips and increased volunteer work of all kinds by pupils."

"Continued visits of pupils to the laboratory and the bringing in of specimens, clippings, etc., after they finish biology."

"All I can say is that pupils give me some satisfac- that a good percentage of the students respond to the Nature Study idea, particularly as this is a city environment."

These quotations together with Table 6 show that most of the impressions are evidently the results of observation of isolated instances rather than being inclusive enough to justify a claim that all or even a majority of the pupils of a given teacher had improved in their use of leisure time as a result of the biology course. Perhaps that is all any teacher can do at present.

Importance Attached to Leisure-Time Teaching by Biology Teachers.

The status as revealed by responses to checking list.-- Item 6 on the checking list afforded the respondent an opportunity to express one of four opinions in regard to the importance of leisure-time education. Of all the schools supplying data for this study, 37 per cent replied that leisure-time education is a major objective of the course, 44 per cent that it is a minor objective, and 19 per cent held it to be incidental to other instruction. Not a single respondent indicated that it is "unworthy of consideration." Inspection of Table 7 shows that in only 24 per cent of the schools in the New England area is leisure-time teaching deemed to be major objective of biology courses whereas 40 per cent of Southern schools so considered it. Table 8 shows the standing of this objective in schools of different sizes and types of organization.

The status as revealed by explanatory comments.-- Three explanatory notations indicate that a few teachers at least are changing their views in regard to the importance of the leisure-time objective, as follows:

> "Time requires that No. 2 (minor) be followed. However, personally I favor No. 1 (major objective)."
>
> "It is worth a great deal more consideration than it has been given. A great deal more emphasis will be given this next year."
>
> "A major objective with health, etc."

Table 7

Percentages of schools in the same and different geographical areas supplying data for this study which consider leisure-time teaching to be a major, minor, or incidental objective of a course in biology.

Importance of Leisure-Time Teaching	Percentages of Schools Supplying Data for this study.					
	New England	Middle Atlantic	Southern	Middle Western	Western	Total
Major objective	24	36	40	39	39	37
Minor objective	56	40	30	46	44	44
Incidental to other instruction	20	24	25	15	17	19

Table 8

Percentages of schools having the same and different types of organization and the same and different sizes of average grade enrollment which consider leisure-time teaching to be a major, minor, or incidental objective of a course in biology.

Importance of Leisure-Time Teaching	Percentages of Schools Supplying Data for this study					
	Types of organization			Sizes of average grade enrollment		
	Regular	Reorganized	Unclassified	195 or fewer	196 to 390	391 or more
Major objective	44	32	31	37	41	35
Minor objective	32	39	69	50	34	40
Incidental to other instruction	24	19	0	13	25	25

Whatever may be the theoretical attitude of biology teachers, in practice they do not agree on the importance of leisure guidance as an objective of a biology course. Probably more clarity in defining the meaning of "major" and "minor" as herein used would have resulted in a more decisive response.

Extent to which Biology is Required of Pupils.

Status as revealed by checking-list items.-- The importance attached to biology by school administrators may be measured in some degree by the extent to which biology is required of pupils. In only 3 per cent of the schools reporting is biology required of all pupils. In New England and the Middle West none of the schools require biology of all pupils whereas the South leads with 10 per cent of the schools requiring it. (See Table 9) However, 37 per cent of the schools replying require it of pupils in at least one curriculum which means that 63 per cent of the schools do not require it of any pupils in the school. As a rule, the smaller schools require it more frequently than the larger schools and regular nearly twice as frequently as reorganized types.

Table 10 shows the extent to which biology is required of pupils in different curricula for different areas. It is required of pupils enrolled in the scientific curriculum more than half again as frequently as of the pupils in any other curriculum.

The status as revealed by explanatory comments.-- Biology

Table 9

Percentages of schools in the same and different geographical areas supplying data for this study which require biology in different numbers of curricula.

Biology Required of pupils in	Percentages of Schools Supplying Data for this study.					
	New England	Middle Atlantic	Southern	Middle Western	Western	Total
At least one curriculum	48	40	45	24	39	37
One curriculum only	28	20	10	13	13	17
More than one curriculum	20	20	35	11	26	20
All curricula	0	4	10	0	9	3

Table 10

Percentages of schools supplying data for this study which require biology for pupils enrolled in the same and different curricula.

Curricula in which biology is required of pupils	Percentages of all schools supplying data
Scientific	18
Commercial	11
General	11
College preparatory	10
Household arts	10
Civic	6
Classical	5
Normal training	3
Manual arts	2
Nursing training	2
Others	0

is a requirement for graduation from all high schools in the State of West Virginia. Nine replies indicate that at least one science course is required for graduation, as follows:

> "State law requires one major science (biology, chemistry, or physics) for high school graduation."-- Union High School, Phoenix, Arizona.
>
> "One year of science is required but not necessarily biology." -- Hastings, Nebraska, High School.
>
> "Two sciences are required in North Dakota."-- Carrington, North Dakota, High School.
>
> "One year of science required and most students take biology."-- Eugene, Oregon, High School.

Other comments indicate that although biology is not a required subject it is advised, as follows:

> "Not required, but all sophomores take it with few exceptions."-- Shelton, Connecticut, High School.
>
> "Pupils are encouraged to take biology, ninety-five per cent or more take biology."-- Senior High School, Durham, North Carolina.
>
> (Not required) "But a large majority of the juniors in the school elect it."-- Lawrence, Massachusetts, High School.

A few replies show that biology is suggested when vocational plans are known, such as medical or nursing although it may not be required of any curriculum.

From the data presented, the writer concludes that although here and there a few administrators think highly enough of the biology courses in their schools to require it of all pupils or of those in certain curriculum groups, for most schools it has not yet justified itself sufficiently to be included as a constant for all pupils. Probably more attention

by biology teachers to the objectives of secondary education would result in a more wide-spread recognition of the value of biology as a subject of study by secondary school pupils.

Extent to which Credit is Allowed for Voluntary Supplementary Work for Pupils.

The significance of such procedure for leisure guidance.--Following out the theory heretofore stated, the school which is doing the most for guidance in the worthy use of leisure is the school which induces the greatest number of its students to spend their leisure in worth-while activities. The goal is not merely to arouse interest in worthy activities but to actually form habits of participation in such activities. Mere suggestion that certain worth-while activities may prove enjoyable to pupils is not enough, a more tangible reward is necessary as an inducement to secure participation by the majority of pupils. If an experience gives pleasure to a person he is apt to try it again, if it is unpleasant, then it is unlikely to be adopted as an habitual method of occupying his leisure hours. The aim of the teacher, then, should be to induce pupils to try out a variety of worth-while leisure pursuits with the expectation that many pupils will find one or more such interests which may become hobbies.

Items were included in the checking list to determine the frequency with which extra credit is allowed for volunatry supplementary work, the methods used to give recognition, and the types of work so credited.

The types of work for which credit is allowed.-- Table 11 lists the types of voluntary supplementary work for which credit is allowed, and beside each is shown the percentage of all the schools supplying data which credit that particular type of work. Examination of Table 11 reveals that nearly all schools allow credit for at least one type of extra work and that nearly three-fourths allow credit for at least three types. The following statements written in connection with this item are illuminating regarding the attitudes of some teachers:

> "We accept anything a student may bring in of a biological nature."-- Union High School Phoenix, Arizona.
>
> "Any of special interest to the student."-- Salina, Kansas, High School.
>
> "Any activity which a student wants to follow. Use of work purely voluntary but is necessary for a high grade."-- Maplewood High School, Louis, Missouri.
>
> "All pupils are required to do some supplementary reading. In most cases this leads to further reading at their leisure. While a project, similar to those suggested (included in Table 11) is not required for credit, the pursuit of some project or hobby is so constantly encouraged that very few children pass up the opportunity."-- Nina Henry Sherman, University High School, Ann Arbor, Michigan.

Other types of activities credited, in the order of frequency of mention, are as follows: bringing in specimens; work in greenhouse; investigating local health problems; caring for home gardens and pets; diet experiments; talks before assemblies and clubs; reports on eminent biologists; writing poems and short stories; participation in debate and annual school exhibits; making microscope slides, soap carving, and salt-and-flour models.

Table 11

Percentages of schools supplying data for this study which allow credit for the same and different types of voluntary supplementary work.

Types of voluntary supplementary work for which credit is allowed.	Percentages of schools Supplying Data.
Making collections of flowers, leaves, insects, or ferns.	93
Outside reading from a list of approved books	77
Reports on current newspapers or magazine articles	73
Making a scrapbook on biology	71
Making maps, charts, or graphs	67
Drawing diagrams	65
Building bird houses, terraria,or aquaria	53
Making cartoons or posters	51
Dissections	50
Reports of visits to museums, zoos, parks, or forests	50
Nature photography	42
Making clay models	41
Keeping nature calendar or diary	40
Taxidermy	32
Building habitat exhibits	31
Others	28

The very favorable showing of the schools in respect to this item coupled with the status of leisure guidance as previously revealed, indicates that teachers may be doing effective teaching for worthy use of leisure all unconsciously. The reader must bear in mind, however, that a given type of voluntary supplementary work may have been checked as credited even though only one pupil in all a given teacher's classes has engaged therein.

Methods employed for recognition of voluntary supplementary accomplishment.-- The response to the checking-list item calling for such information showed that of the schools supplying data for this study, 88 per cent give a higher grade for the term for voluntary supplementary work. Mrs. Sherman of University High School, Ann Arbor, Michigan, states that though credit is allowed "the grade is really influenced very slightly. If a pupil is on the border line between two grades, his supplementary work would influence toward the higher." At Mount Holly, New Jersey, High School, such credit is used to "make up for other weak points." "One to three per cent on monthly grade" is allowed at Bennett High School, Buffalo, New York.

Table 12 portrays the distribution of methods of recognizing additional work according to geographical areas. It is noteworthy that all the schools reporting from the Middle Atlantic states allow a higher grade for the term for such work. There is almost no difference between regular and re-

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Table 12

Percentages of schools supplying data for this study in the same and different geographical areas which give recognition for voluntary supplementary work of pupils by higher grade for the term, credit toward honors, and in other ways.

Methods used for additional recognition	Percentages of Schools Supplying Data for this Study					
	New England	Middle Atlantic	Southern	Middle Western	Western	Total
Higher grade for term	92	100	70	87	86	88
Credit toward school or graduation honors	0	4	10	17	0	7
Other ways	4	32	5	2	8	9

organized types of schools but size apparently influences the degree of recognition. As revealed in Table 13, the smallest schools as a group have a lower percentage than the groups of medium or larger schools.

In addition to the methods listed in the tables, a few others were noted as follows:

> "Write-up in school paper and comment in class."-- Dunbar High School, Washington, D.C.
>
> "Higher personality record."-- Newport News, Virginia High School.
>
> "Public recognition."-- Great Falls, Montana, High School.
>
> "Freedom of working out own project after regular work is finished."--Eugene, Oregon, High School.
>
> "Extracurriculum credit toward seventeenth unit."-- Central High School, Aberdeen, South Dakota.

In relation to school honors, Miss Stephens of Smith-Cotton High School, Sedalia, Missouri, writes: "Representing school in contests. Have even won first place in state."

Some teachers of biology evidently realize the value of the stimulation provided by additional recognition for individual work. A wider application of the policy will make possible more complete development of individual interests as well as abilities and needs. This in turn helps to reduce the formalism and enhances the prospects of achieving better leisure habits.

Class Room Provision for Leisure Guidance

The relationship of leisure guidance to the biology

Table 13

Percentages of schools supplying data for this study and having the same and different types of organization and sizes of average grade enrollment which give recognition for voluntary supplementary work of pupils by higher grade for term, credit towards honors, and in other ways.

Methods used for additional recognition	Percentages of Schools Supplying Data for this Study					
	Types of organization			Sizes of average grade enrollment		
	Regular	Reorganized	Unclassified	195 or fewer	196 to 390	391 or more
Higher grade for term	88	89	84	83	98	95
Credit towards school or graduation honors	10	7	0	8	12	5
Other ways	8	10	15	5	10	12

class room.-- Worthy habits of using leisure are formed by participation in worth-while activities. Pupils engage in activities which interest them and for as long as the interest lasts. Therefore, teachers should know and use practices, equipment, apparatus which will appeal to pupils, arouse their interest, and lead to their participation in activities of worth. This constitutes genuine leisure guidance. Hence in appraising the effectiveness of teaching for leisure, it will be enlightening to discover the extent to which schools use certain procedures, types of equipment and apparatus, specimens, and books in their biology class rooms.

Teaching practices used in guidance for leisure.-- As the reader will see from Table 14, in 79 per cent of the schools supplying data for this study, time is devoted to the discussion of current events of biological import. The Southern area ranks highest in this respect with 85 per cent and New England lowest with 40 per cent. In only 28 per cent of all the schools does the text book used contain a section on biology for leisure.It is noteworthy that only 60 per cent report that any time is devoted to motivation of voluntary nature study, an aspect of biology which has great avocational possibilities.

As the information disclosed by Table 14 is only qualitative, the reader has no way of knowing whether much time or little is devoted to such practices. On the average, each of these schools employs 2.5 of these practices which is more

Table 14

Percentages of schools supplying data for this study which use certain practices in the biology class room for leisure guidance.

Practices used in biology class rooms for leisure guidance	Percentages of Schools Supplying Data for this Study
Time devoted to discussion of current events of biological import	79
Class work planned with definite aim of arousing interest	78
Time devoted to motivation of voluntary nature study	60
Text book used contains a section on biology for leisure	28
Other practices used	10

than half the number listed on the checking lists.

Distribution of schools according to size and type of organization shows that for the first and last items in Table 14 there is a direct correlation with size, for the percentage increases for each of the two items as the size-group of the schools increases. The regular type shows a somewhat larger percentage than the reorganized type of school in the first and second items in Table 14, but the data are not in themselves significant.

Under the heading of "other methods" used for leisure guidance in connection with class room work are mentioned:

> "Exhibitions on wall," West Haven, Connecticut, High School.
>
> "One contribution required of all pupils," John Marshall High School, Rochester, New York.
>
> "Show some previous years' projects," Bennett High School, Buffalo, New York.
>
> "Emphasis on conservation," Sutton, West Virginia, High School.
>
> "Some outside work required each marking period. Some home work assignments are collecting or individual field trips." Ashland, New Hampshire, High School.
>
> "Special projects in advance for special students." Central High School, Tulsa, Oklahoma.
>
> "Students are encouraged to exhibit and report on leisure-time activities of a biological nature in class throughout the year as a means of developing good leisure-time habits----," Chapman Technical High School, New London, Connecticut.
>
> "Special units independent of text are used. These units are on wild flowers, trees, and a bit on birds. Field trips on school time are an important feature." Mount Holly, New Jersey, High School.

These comments convey the thought that the teachers writing them have grasped more or less clearly the idea that to train for leisure one must arouse interest in activities pupils can use here and now, and then insist that at first, all pupils must try out some one or more experiences possessing avocational possibilities.

Vacation time represents a large portion of the leisure which students have to spend for good or ill. For this reason the teacher is justified in carrying out certain practices in the class room to stimulate interest in worthy vacation activities. Many of these cannot be pursued during school days and for this reason special procedures may be necessary in order to maintain the interest when school has closed. This is particularly true for the long summer vacations. An item was included in the checking list to discover practices along this line. Table 15 reveals the degree to which the schools supplying data for this study utilize such procedures. Nearly half of these schools devote time before school closes to the discussion and planning of summer activities. Focusing the attention of pupils on such planning is itself a step toward successful leisure guidance, for right acting usually must be preceded by right thinking. One-third of the schools conduct discussion or exhibition of results of vacation experiences in September as a form of reward for diligence in certain lines during the summer time.

The fact that many of their companions deem certain pas-

Table 15

Percentages of schools supplying data for this study which carry out certain procedures to stimulate interest in the worthy use of leisure during vacations.

Types of procedures carried out to stimulate interest in worthy use of leisure during vacations.	Percentages of Schools Supplying Data for this Study
Time devoted to discussion and outlining of summer activities before school closes	46
Time devoted in September to discussion or exhibition of vacation activities	33
Accounts of vacation activities or experiences of pupils published in school paper or department bulletin	23
Bulletin issued listing possible vacation nature adventures	10
Teacher meets with groups of pupils occasionally during the summer	6
Other procedures used	7

times to be interesting and reputable raises otherwise unthinkable activities in the estimation of some persons. That there are fads in avocations which come and go detracts nothing from their worth-whileness. Conversely, popularity does not increase the worth of an intrinsicly futile pastime.

On the average each school carries out 1.2 of these pre-post-vacation procedures. They are fairly evenly distributed, for the highest ratio of 1.6 is among the Middle Atlantic schools and the lowest of 0.9 in the Western area. Little variation is noticeable when considered by type of organization or of size.

Under "other procedures," most of the statements merely enlarge upon one of the practices listed. A few noteworthy procedures are as follows:

> "Give out lists of books containing worth-while projects,"-- Framingham, Massachusetts, Senior High School.
>
> "We run a science magazine second to none in the city," James Monroe High School, New York City.
>
> "Summer hikes," Kenton, Ohio, High School.

Class-room equipment as an aid to leisure guidance.-- Certain types of equipment are recognized as being helpful to the biology teacher in vitalizing his course by increasing the interest of pupils. Hence such adjuncts to the biology class room as aquaria, terraria, museums, bulletin boards, greenhouses, and conservatories all have some value in guidance for leisure.

Only 11 per cent of the schools supplying data for this

study report that they have a school greenhouse, 15 per cent have a conservatory connected with the biology class room, and 7 per cent have both a greenhouse and a conservatory. None of the schools in the New England area have a greenhouse. The Middle Atlantic schools lead with 20 per cent having greenhouses while the Middle Western area leads in the proportion of conservatories with 24 per cent.

Table 16 reveals the consistent lead of the reorganized over the regular type of school and of the group of larger over the group of smaller schools in each respect tabulated therein.

One comment from Dunbar High School, Washington, D. C., indicates that they have a greenhouse but that it has not been used for three years because it needs repairs. At Phoenix, Arizona, the Union High School finds its school garden provided for the needs of the biology department. No statements were added to yield any information regarding the uses made of these greenhouses or conservatories. Apparently the expense involved has limited the construction and maintenance of such adjuncts to the larger and more prosperous school communities.

A bulletin board is maintained by 84 per cent of the schools supplying data for the study. Of these, 20 per cent renew the contents every week, 42 per cent when work is started on a new unit or topic, 3 per cent about once in two weeks, and 35 per cent renew material at irregular intervals. The Middle Atlantic schools rate highest with 96 per cent re-

Table 16

Percentages of schools supplying data for this study having the same and different sizes of average grade enrollment and types of organization which maintain certain types of equipment for use of biology departments.

Types of equipment maintained	Percentages of Schools Supplying Data for this Study				
	Sizes of average grade enrollment			Types of organization	
	195 or fewer	196 to 390	391 or more	Regu-lar	Reor-ganized
Greenhouse	3	4	18	6	15
Conservatory connected with class room	5	21	20	10	19
Both greenhouse and conservatory	3	7	10	4	7
Bulletin board	68	85	98	82	85

porting that a bulletin board is maintained and the lowest area, the Western averages 73 per cent. Reference to Table 16 reveals the close connection between size and frequency of bulletin board maintenance. It may be that a greater degree of specialization accounts for this, or that the more progressive teachers are drawn to larger systems. The cost of bulletin boards is a negligible factor here as it is so small.

The writer notes a slight negative correlation between the frequency of renewal of contents and the size of school, probably due here to the smaller number of different subjects per room and per teacher. Hence there is less likelihood of the discovery of new material than when more than one teacher uses the same bulletin board.

Little can be gleaned regarding the use made of bulletin boards, how spacious they are, or whether pupils or teachers supply most of the material. Two comments afford some inkling regarding these points.

At Tulsa, Oklahoma, Central High School, "About the whole wall is used and illustrative matter for clarifying understandings in the unit are changed as needed for each new lesson."

At Concord, New Hampshire, Senior High School, "Pupils collect, bring in, and discuss clippings pertaining to a unit,-- said clippings to be placed on bulletin board until ample time has been had for perusal."

Responses to other items on the checking list reveal that

88 per cent of the schools supplying data for the study maintain an aquarium in an active condition, potted plants are kept by 77 per cent, a museum and a terrarum by 53 per cent each, and a vivarium by 34 per cent. There are no significant differences among geographical areas or types of organization, but again the group of larger schools far exceeds the smaller in these respects, maintaining an average of 4 out of the 5 teaching aids listed above. The medium-sized group average 3.1 and smaller schools 2.7 per school. As in the case of bulletin boards, cost is here the least significant factor, except as it is reflected in space provided within the class room for such accessories.

A few respondents mention specialized types of aids, similar to those listed above for arousing and maintaining interest, such as: hay infusions, wild flower exhibits, rock gardens, wild-flower and fern gardens, seedling boxes, moss life-cycles, and protozoa cultures.

Visual aids to leisure guidance.-- Projection of moving pictures, lantern slides, strip films, microscope slides, and opaque objects such as photographs all have value in creating interests in phases of biological science. The checking list requested information on the use made of motion pictures and lantern slides only. 47 per cent of the schools make no use at all of motion pictures in biology classes. 6.0 reels of motion pictures are shown in each biology class during the school year as an average per school for all schools supplying

data for this study.

The average for reorganized schools is 6.9 as compared to 6.0 for those having the regular type of organization. The averages for the groups of smaller, medium, and large schools are 4.3, 4.6, and 10.7 reels respectively. Taken by geographical areas, the variation is from 9.6 for the Middle Atlantic area (with 60 per cent of its schools in the larger group) to 3.5 reels for Southern schools. Cost is a significant factor here as well as proximity to a film library.

The question in regard to the number of lantern slides available for use in the biology class room elicited the information that 38 per cent of the schools have no lantern slides available. Several of the replies indicate that they use film strips and for purposes of tabulation one film strip was arbitrarily considered as the equivalent of 20 lantern slides. On this basis the number of lantern slides available for use in biology class rooms averages 161 per school for the schools supplying data for this study.

Here the schools having the regular type of organization average 208 compared to 148 for reorganized. Averages of 86, 94, and 335 respectively for small,- medium,- and large-sized schools is consistent with other points of superiority evinced by larger schools. The averages are 273, 212, 145, 67, and 54 slides per school for the Middle Atlantic, Middle Western, Southern and New England areas respectively.

Living specimens as aids to leisure guidance.- The ex-

hibition of a living specimen of a plant or animal has more power to evoke interest among pupils than almost any other class room procedure. The leisure-guidance value of a course in biology would be slight indeed if no living organisms other than specimens of homo sapiens entered the class room during the year. Clifford O. Johnson, Biology teacher in Marion, Iowa, High School succinctly expresses this thought as follows:

> Biology when well taught arouses an interest and an appreciation of nature, man included. This reaction is best secured by using in the majority, living specimens secured by each student. From a keen interest it is but a short step to hobbies, which is one form of use of leisure time.

An item on the checking list called for the number of different species of each of certain types of animals brought into the biology class room during the school year. From the character of the responses the writer concludes that some teachers must have interpreted the item to refer to numbers of specimens instead of numbers of species. Inasmuch as the data thus became unreliable as a basis for tabulation, the writer accepted each number greater than zero as indicating that at least one species illustrating that type had been brought into class during the school year. Tables 17 and 18 were built on this basis.

Table 17 reveals that live amphibians were present in biology class rooms in the largest number of schools and that echinoderms as a type were least often brought in alive. For all schools supplying data for the study, an average of 9.6 per school out of the 15 different types were exhibited in

Table 17

Percentages of schools supplying data for this study in which at least one specimen of certain types of living animals was brought into the biology class room during the school year.

Types of living animals brought into biology class room during school year	Percentages of Schools Supplying Data for this Study
Amphibians	89
Reptiles	88
Butterflies	85
Fishes	82
Worms	82
Insects (exclusive of butterflies)	78
Arachnids	77
Crustaceans	73
Mammals	71
Mollusks	65
Protozoa	64
Birds	62
Coelenterates	23
Echinoderms	15
Other types	6

Table 18

Percentages of schools supplying data for this study in which at least one specimen of a plant, not dried or pressed, was brought into the biology class room during the school year to illustrate certain types of plant structures.

Types of plant structures illustrated by specimens of plants brought into class	Percentages of Schools supplying Data for this Study.
Flowers	82
Leaves	82
Stems	76
Seeds	75
Roots	73
Fruits	71
Spores	62
Colonies	37
Other types	9

classes during the twelve months preceding the reply to the checking list item. No significant difference is apparent on analysis of a distribution by geographical area or by type of organization, but averages of 9.1, 9.6, and 10.3 respectively for small,- medium,- and large-sized schools show the last-named group to be profiting most by the presence of live animals in biology classes.

Other types of living animals represented include myriapods, sponges, and rotifers.

From Clayton High School, St. Louis, Missouri, comes the statement that the protozoa checked included those used in a lecture on microprojection by Doctor George Rommert.

At Gardner, Massachusetts, High School, class room observation of amphibian eggs has helped to make the course more interesting to pupils.

That animals need not always be inside the class room to be observed,is disclosed by this explanation from Flossie Martin, Head of the Science Department of Richard J. Reynolds High School, Winston-Salem, North Carolina:

> Due to the fact that a large holly tree and thick clumps of shrubbery grow on the campus in full view of our class room windows, we have daily opportunity to observe birds. During the year we have frequently watched mocking birds, cedar wax-wings, starlings, purple grackles, gold finches, robins, chipping sparrows, white-throated sparrows, flickers, doves yellow warblers, chewinks, cardinals, juncos, brown thrashers, titmice,etc.

Analysis of Table 18 shows that plant specimens to illustrate flower modifications were brought into class rooms most often and those representing colonies least often. An

average of 5.7 types per school out of the 8 types of structures listed for all schools supplying data for this study were exhibited in biology classes. No significant differences were found on tabulating averages by geographical areas or by types of organization. However, distribution by sizes again finds the large-sized schools leading by a 6.0 average, and small-sized schools trailing with 5.3 average, and medium-sized in between with 5.9 as an average.

Other types not on the list represented by specimens were: galls, fungi, algae, evergreens, mosses, lichens, bulbs, tubers, runners, rhizomes, cacti, and sensitive ferns.

A desirable stand is taken at Thomas Jefferson High school, Richmond, Virginia: "Many flowers we do not collect but advise students to protect."

The fortunate situation of Richard J. Reynolds High School at Winston-Salem, North Carolina is further demonstrated by the statement:

> Around the buildings are pines, dogwood, beech, white, red, and Spanish oak, red and sugar maple, mulberry, ash, redbud, wild cherry, cedar, mimosa, ironwood, blackgum, sassafras, service berry, hickory, walnut, tulip, poplar, and other species of trees besides many berry-bearing shrubs, so when it is time to study roots, leaves, seeds, etc., we go out and find them among the trees and shrubs or weeds which the gardners forget to dig up.

Books as aids to leisure guidance.-- The chief reliance of a teacher having many pupils must be upon books. The basic text used in biology classes in a large measure determines the form and content of the course. To guide pupils toward worthy use of leisure most successfully, teachers should know and use

the books which are best adapted to help them in so doing.

Table 19 makes known the text books most frequently used in the schools supplying data for this study, also the extent to which the teachers using each text consider that it treats biology for leisure time adequately. Twenty-five per cent of all these schools report that the text book they are using treats biology for leisure time adequately yet on another item only eighteen per cent do not find it necessary to supplement the text in this respect, which means that seven per cent consider the text adequate, yet at the same time find it necessary to supplement the text. Perhaps the explanation for this discrepancy lies in the belief that the text is adequate in that it does all a text book can do but that even this is not sufficient.

The fact that some schools are using more than one basic text accounts for any apparent discrepancy between the number of schools supplying data (134) and the total obtained by adding together the numbers of schools using each book. (182) Nine of the books in use are considered by no teacher reporting to be adequate with respect to biology for leisure and only three of the books are considered adequate by at least half of the schools using it and which supplied data for this study. It is noteworthy that the percentage of the text rating highest in this respect is based on the opinion of only three schools. Before adopting a text book teachers will do well to consider its treatment of biology for leisure time.

Four schools in the Middle Western area indicate they use

Table 19

Numbers of schools using each of certain biology text books and percentages of schools using each which consider the text treats biology for leiaure adequately.

Authors and Titles of Biology text books in use in certain schools	Numbers of Schools Supplying Data which use each text	Percentage of Schools using each book which consider it treats biology for leisure adequately	
Smallwood, Reveley,and Bailey --- New General Biology	50	12	*(12)
Hunter ---------- Problems in Biology	18	22	(9)
Moon ---------- Biology for Beginners	14	7	(14)
Moon and Mann ---------- Biology for Beginners	13	23	(8)
Curtis, Caldwell, and Sherman --- Biology for Today	13	38	(4)
Pieper, Beauchamp and Frank ----- Everyday Problems in Biology	11	36	(5)
Baker & Mills ---------- Dynamic Biology	11	63	(2)

* Numbers in parentheses refer to relative standing of the particular book in regard to highest percentage of users which consider that it treats leisure-time adequately.

Table 19(continued)

Authors and Titles of Biology text books in use in certain schools.	Numbers of Schools Supplying Data which use each test	Percentage of Schools using each book which consider it treats biology for leisure adequately	
Wheat and Fitzpatrick-------Advanced Biology	6	15	*(10)
Hunter ----------New Essentials of Biology	4	0	-
Mank ----------The Living World	4	25	(6)
Meier ----------Essentials of Biology	4	25	(6)
Gruenberg ----------Biology and Human Life	3	66	(1)
Bailey ----------Botany for Secondary Schools	2	0	-
Hunter ----------New Civic Biology	2	50	(3)
Peabody and Hunt ----------Biology and Human Welfare	2	0	-
Pout and Evans----------First Course in Botany	2	0	-
Wagner ----------Modern Biology	2	0	-
Clement ----------Living Things	1	0	-

Table 19 (concluded)

Authors and Titles of Biology text books in use in certain schools	Numbers of Schools Supplying Data which use each text	Percentages of Schools using each book which consider it treats biology for leisure adequately	
Hegner ----------Practical Zoology	1	0	* -
Linville ----------Biology of Man and Other Organisms	1	0	-
Linville, et al --------Zoology	1	0	-

* Numbers in parentheses refer to relative standing of the particular book in regard to highest percentage of users which consider that it treats leisure-time adequately.

no basic text but a reference-book plan or library method. This is true in Central High School, Muskogee, Oklahoma, where no text book is used but they "use work sheets and 14 kinds of biology books with from two to four dozen of each, also fewer numbers of many others." Such a plan has much to commend it especially where students must purchase their own text books.

An item in the checking list brought out the fact that the schools supplying data for this study have an average of 2.3 supplementary-reading books per student per school. This refers to books in the school or department library, not to the basic text. However, only 55 per cent of the checking lists returned furnished any information on this item. Table 20 is included to show the great variation among schools in different geographical areas. On this point the small-sized schools have an advantage over the larger for the averages are 2.8, 2.1, and 2.4 books per pupil per school for small-, medium,- and large-sized schools respectively. No significant variation is evident when analyzed according to types of organization.

In some schools a certain amount of supplementary reading is compulsory, in others it is voluntary but strongly urged, and in many the attention of the teacher to this phase is desultory at best. Arrangments usually may be made with public libraries to have books pertaining to biological subjects under discussion placed on reserve for use of biology students for a period of time and thus augment the limited resources of

Table 20

Average numbers of supplementary-reading books per biology pupil per school in school or biology department libraries for schools in the same and different geographical areas.

	Average Numbers per School in Schools Supplying Data for this Study					
	New England	Middle Atlantic	Southern	Middle Western	Western	Total
Supplementary reading books per student	0.8	1.8	1.6	3.8	1.6	2.3

the school library.

The following comments are suggestive of desirable practices:

"Each student reads approximately five books per year. We also take six good nature magazines."-- Eugene, Oregon, High School.

"Hundreds of folders of special articles related to the work on file."-- Central High School, Tulsa, Oklahoma.

"We have no school library but the department buys Nature Magazine, American Forests, and Natural History as well as some copies of National Geographic."-- Lawrence Massachusetts, High School.

"We have many bulletins and a nice selection of library books."-- Broughton High School, Raleigh, North Carolina.

"Reading scientific literature is stressed. Many interesting pamphlets and magazines are taken by the department. Each student is required to complete a specified amount of outside reading for each unit."-- Elkins, West Virginia, High School.

Noteworthy Procedures Used for

Leisure Guidance in Certain Schools.

Procedures involving teachers of biology primarily.-- The final item on the checking list asked the teacher to state what he had done within twelve months with the intention of developing better leisure habits in his biology students. This question elicited responses from 54 schools in all. Some merely repeated or enlarged upon details covered in previous items of the checking list. Others described practices each had developed and used as an integral part of the biology course. The writer will reserve for a later section the procedures concerned with extracurriculum work of the biology

departments and will include here only such procedures as are involved in the regular work of the biology course. To avoid repetition, only a few representative comments are given. These are divided into practices involving the teacher primarily and those pertaining to pupils primarily. The former are presented first.

Five replies indicated that the teachers had taken or were planning to take courses in nature study to enable them to do more along this line in their teaching.

In three schools, revision of the course of study for biology has been taking place in which the development of desirable leisure habits has been stressed. That the teachers in Morton High School, Richmond, Indiana, have a clear conception of the importance of such effort is demonstrated by the following statement:

> We are rewriting our course of study, making definite reference in each unit to the seven cardinal principles--- not in a soon-forgotten, perfunctory preface, but in specific suggestions imbedded within the units themselves.

A practice worth testing is reported from Phoenix, Arizona, Union High School, where the amount of required work was curtailed "in order to reduce homework assignments and encourage home projects. The 'doing' of projects is purely a matter of choice." However, they may constitute 25 per cent or more of the term grade as it is hoped that "the doing of projects would promote and encourage the development of in-

terests and hobbies in Nature Study, therefore helping to give some definite leisure time activity."

The following statement of a practice in White Pine County High School, Ely, Nevada, indicates recognition of the value of planning work to create interest in the subject at the start of the course:

> We attempt to give the student as complete a picture of the field of biology as we can during the first three weeks. In this we attempt to keep out a technical vocabulary and appeal to pupil interests by talking pupil language. In this we include as many practical applications as possible.

Several statements are quite general in character as for example:

> "I have tried to encourage a love for wild plants and animals," and "I try to keep them alert-- looking for things pertaining to the subject, whether they are riding, walking, or even reading."

However, there are a few teachers who have definite plans for leisure guidance although they may not be very specifically outlined, such as:

> "Made frequent suggestions, under units, how one might spend leisure time for more knowledge of the topic."-- Colby Junior College, New London, New Hampshire.

> "Encouraged students to visit biological sources, as beach, hospitals, manufacturing plants, etc., to obtain material."-- Los Angeles, California, High School.

> "We have urged this term a short project from any phase of biology that appeals to each pupil."-- Little Rock, Arkansas, Senior High School.

> "There is continual emphasis placed upon the practical application of biological principles. We desire our students to use their biological knowledge both when at work and at leisure."-- Newport News, Virginia, High School.

G. E. Noyes, of Great Neck, New York, High School states:

> "I have tried to develop better leisure-time habits chiefly through emphasis and presentation of subject matter, also through the use of bulletin-board material, class room live stock, all sorts of reading material, talks in the class room, and informal visits with any and all pupils after school to discuss interests, and sponsorship of wild-flower and bird sanctuary which is a cyclone-fenced enclosure, 207 feet by 75 feet, and is a part of the school plant."

> "I have endeavored to stimulate interest in project work during vacations and after school hours. This has been attempted by book lists; talks by adults interested in certain phases of work, as well as by students themselves; display of collections in room; and clippings from periodicals stating the worth-whileness of such pursuits as may be contemplated. Conferences, suggestions, challenges, and competitions also help in bringing out individual initiative and create desire. Field trips and class projects also stimulate the accomplishment of some worth-while leisure project."-- Concord, New Hampshire, Senior High School.

At Clayton High School, St. Louis, Missouri, additional original work is necessary to secure a superior grade and "all students are required to make wild-flower collections, insect collections and learn to identify 50 birds."

One teacher said that his efforts toward leisure guidance consisted in trying to get a film projector and another that he served as nature study examiner for Boy Scouts.

Another teacher made his own moving-picture films on insect life and certain reptiles for class room use.

Procedures pertaining to biology pupils primarily.-- Some of the pupil activities listed as contributory to desirable leisure-habit formation are as follows: wild-flower collection, specimen collection, hobby show, keep teeth charts, keep food charts, landscaping homes or school grounds, reports on bio-

logists, making wall charts, debates, tree identification, microscopy, visits to Civilian Conservation Corps Camps, tree planting, insect collections, fossil collections, biological surveys of school grounds, leaf printing, and scrap-book making.

At Bennett High School, Buffalo, New York, nature walks have been combined with mileage of walking required by gymnasium department.

At Poughkeepsie, New York, High School, laboratory work in biology "has been of the nature which will lead to hobbies, and better leisure-time habits. One recent example: Making plaster casts of leaves for a permanent record and of footprints found in the open."

Many of the above-mentioned procedures represent departures from the "traditional" biology subject-matter requirements and emphases. The teacher experimenting with similar practices should realize that the aim is not perfection of skill or knowledge so much as it is to try out possible avocational experiences.

CHAPTER IV

THE STATUS OF LEISURE GUIDANCE THROUGH EXTRACURRICULUM ACTIVITIES RELATED TO BIOLOGY IN CERTAIN HIGH SCHOOLS

Extent to Which Leisure Guidance is Extracurricular

The proportion revealed by responses to checking-list items.-- Guidance for leisure is not attained to the greatest extent possible when no biological activities under the teacher's supervision take place outside of the class room. Neither is leisure teaching fully successful when all of it takes place outside of the biology class room. A proper balance between the two is the ideal combination. The writer knows of no way of determining what this proper balance is. However, an item was included in the checking list to shed some light on the relative proportion of leisure-time teaching which is conducted outside of the biology class room.

Forty-two per cent of all the schools supplying data for this study indicated that practically none of their leisure-time teaching is conducted outside of the class room. Thirty-five per cent report about one-fourth, fourteen per cent about one-half, five per cent about three-fourths, and only four per cent that all of their leisure guidance is conducted outside of the biology class room. This means that in less than

one quarter of the schools is at least half of the leisure guidance extracurricular.

There is no significant correlation between size, type of organization, or geographical location of the schools, and any of the proportions stated in the checking-list item.

The explanation of the proportion revealed by supplementary statements.-- The fact that no leisure guidance is conducted outside the class room in so many schools does not mean that teachers of biology believe this to be a desirable situation. Instead, all the comments seem to indicate that the reverse is true as follows:

> "I have six full divisions."
>
> "A heavy teaching load prevents further time being spent on it."
>
> "Hard times of the past few years have made field trips almost impossible here--no means of transportation."
>
> "The pressure of class work here is so great that a teacher has no time for outside activities of this type."

Extent to Which Biology Departments Sponser Extracurriculum Activities.

Clubs sponsored by biology departments.-- In building the list of clubs to be included in the checking list, the writer consulted several text books on extracurriculum activities for names of clubs which might pertain to the field of biology in the broadest sense of the word. Some respondents evidently interpreted these names on the list to refer to types of club activities carried on in the single Biology or Nature Club which the department was sponsoring. Hence Table 21 refers to

Table 21

Club activities sponsored by biology departments in high schools.

Names of club activities	Percentages of all schools replying which sponsor each type	Names of club activities	Percentages of all schools replying which sponsor each type
Microscope	24	Conservation	4
Bird	21	Forestry	4
Biology	18	Friends of animals	4
Nature	17	Landscape	4
Wild Flower	15	Vegetable gardening	4
Wild Life	14	Zoology	4
Taxidermy	11	Bee Keepers	3
Dissecting	10	Agriculture	2
Tropical fish	9	Campcraft	2
Flower gardening	8	Live Stock	2
Bacteriology	7	Pet	2
Botany	6	Life Saving	2
Hygiene	6	Anglers	1
Butterfly	5	Others	9
Hobby	5		

*(Club activities do not necessarily refer to names of clubs.)

types of activities and not necessarily to names of clubs. Microscope Clubs or microscopy as a phase of club work seems to be most popular as it was checked by 24 per cent of the schools supplying data for this study.

Under the heading of "other clubs" are named Science Club, All-Science Club, Geology Club, Photography Club, Health Council, and Pre-Medic Club. This serves to illustrate many phases of biological science which may be of avocational interest to different persons.

On the average, each school sponsors 2.1 different types of club activities, No significant correlation is apparent between the number of types of club activities and the size or type of organization. However, schools in the Middle Atlantic area sponsor an average of three times as many different club activities as those in New England as is shown in Table. 25.

Visits sponsored by biology departments.-- Table 22 discloses the different types of institutions and other places visited by pupils under the sponsorship of biology teachers. Visits to museums lead, being conducted by 20 per cent of the schools supplying data for this study.

Other places visited include: state experiment stations, aquaria, chicken hatcheries, municipal parks and forests, a hospital, and a food-research laboratory.

On the average each school among those supplying data sponsors 1.1 such visits per year. Here the number correlates

Table 22

Visits sponsored by biology departments of schools to see various places

Types of places visited	Percentages of all schools replying which sponsor each type
Museum	20
Botanical garden	15
Creamery or dairy	15
Greenhouse	14
Filtration plant	11
State park or forest	11
Fish hatchery	10
Zoological garden	10
Bird sanctuary	9
Nursery	9
Seashore	7
Farm	5
National park or forest	4
Others	10

with size as is shown in Table 26 and schools in the Middle Atlantic states exceed those in New England by more than twice as many, and surpass Western schools by sponsoring more than three times as many such visits. (See Table 25)

Field trips sponsored by biology departments to make collections or observations.-- Table 23 shows that nearly half of the schools supplying data for the study sponsor field trips to collect flower or insect specimens. Other types of field trips listed are: to collect leaves, seashore specimens, fossils, animals other than insects; and to observe reforestation and erosion-control work, ecological relationships, or geological formations.

On the average, each school sponsors 2.5 such field trips. The Southern schools sponsor twice as many as those in the Western area. The large-sized schools exceed the smaller and medium-sized schools and there is no significant difference between those having different types of organization. (See Table 25 and 26.)

Other types of extracurriculum activities sponsored by biology departments.-- Table 24 refers to the percentages of all schools supplying data which sponsor other types of extracurriculum work. The reader will perceive that certain activities on the list are included also as part of the regular biology course but this does not necessarily exclude them as extracurriculum possibilities.

Other types added to the list by respondents are: making

Table 23

Field trips sponsored by biology departments of certain schools to make observations or collections

Field trips conducted to:--	Percentages of all schools replying
Collect flowers	45
Collect insects	45
Observe birds	36
Collect fungi	33
Observe nature	33
Collect protozoa	31
Collect ferns	24
Do other activities	6

microscope slides, moving pictures, charts, plaster models, soap carvings, mounts of leaves and twigs, wood exhibits, drawings, insect mounts; also writing poems, plays and short stories; doing spatter work; keeping a nature calendar; stuffing specimens; running a live-stock show and painting nature pictures on glass.

All the schools participating sponsor an average number of 3.6 each of the different activities listed in Table 24. Consult Tables 25 and 26 for differences according to geographical area, size, and type of organization.

Status of biological extracurriculum activities in general.-- Space was provided in the checking list for the respondent to indicate the time when each of the activities sponsored is conducted. For all schools replying, the average number is 4.9 different activities per school conducted during school hours, 5.0 after school hours, 2.3 on Saturdays, and 1.0 during vacations. Thus it is evident that extracurriculum activities are sponsored by the biology departments of schools as often after school hours as during school hours but less than half as often on Saturdays and only one-fifth as often during vacations.

The average unmber of all the different types of extracurriculum activities sponsored by the biology departments including clubs, visits, field trips, and others, is 3.3 different activities per school. This is a very low average number and bears out the statement previously made that only a small fraction of the leisure guidance is extracurricular.

Table 24

Different types of extracurriculum activities sponsored by biology departments of schools replying (Exclusive of those listed in other tables.)

Types of extracurriculum activities reported (other than clubs, trips, visits.)	Percentages of all schools replying
Maintaining bulletin board	45
Specimen mounting	42
Keeping scrap-book	41
Aquarium building	35
Leaf printing	28
Assembly programs	24
Making indoor gardens	21
Terrarium building	21
Free nature lecture	19
Camera hunting	14
Clay modeling	14
Habitat exhibit	12
Beautifying school grounds	9
Hobby show	7
Pet show	6
Making casts of animal tracks	5
Other types	10

Table 25

Average numbers of types of certain extracurriculum activities sponsored by biology departments of certain schools in the same and different geographical areas.

Types of Activities Sponsored Per School	Average Numbers of Types of Extracurriculum Activities Sponsored by Biology Departments of Schools Supplying Data for this study.					
	New England	Middle Atlantic	Southern	Middle Western	Western	Total
Clubs	1.2	3.5	3.0	1.8	2.0	2.1
Visits	1.2	2.6	1.8	1.2	0.7	1.1
Field trips	2.0	3.1	3.2	2.6	1.6	2.5
Other types	3.2	5.0	3.9	3.4	2.5	3.6
All types combined	2.5	4.8	4.1	2.2	2.6	3.3

Table 26

Average numbers of types of certain extracurriculum activities sponsored by biology departments of certain schools having the same and different sizes of average grade enrollments and types of organization

Types of Activities Sponsored	Average Numbers of Types of Extracurriculum Activities Sponsored per School by Biology Departments of Schools Supplying Data				
	Sizes of Average Grade Enrollment			Types of Organization	
	195 or fewer	196 to 390	391 or more	Regular	Reorganized
Clubs	1.7	2.6	2.4	2.4	2.1
Visits	1.2	1.5	1.8	1.9	1.1
Field trips	2.4	2.4	2.9	2.5	2.6
Others	3.2	3.2	4.8	3.9	3.6
All types combined	2.6	3.3	4.0	3.8	3.0

In this composite average, schools having the regular type of organization exceed the reorganized schools somewhat; large schools exceed medium-sized, and the latter in turn exceed the smaller schools; and schools in the Middle Atlantic area lead all others as shown by Tables 25 and 26.

Success of Leisure Guidance as Evinced by Voluntary Extracurriculum Activities of Pupils

Success as revealed by voluntary extracurriculum activities of pupils while enrolled in the biology course.-- The true measure of success of any program for guidance in the worthy use of leisure consists in the extent to which the pupils subjected to the program really improve their habits. The longer the interests abide and continue to lead pupils to use leisure wisely of their own accord, the more successful has been the leisure-guidance program.

An item in the checking list asked teachers to list definite instances of which they knew wherin pupils had taken the initiative in leisure-time activities of a biological nature. The following list includes instances which took place while the pupils were still enrolled in the biology course:

> "I have a pupil who brings in clippings of biological interest every week. A student voluntarily made an incubator of his own and hatched eggs for studying the chick embryo in various stages. One student set up a sealed balanced acuarium."-- Mount Vernon, Ohio, High School.

> "Many students bring in animal specimens without being requested to. You might be interested to know that they have a mania for bringing in spiders, especially black widows. I would discourage this activity if I were not

afraid of discouraging the habit of bringing in other kinds of specimens."-- La Grande, Oregon, High School.

"1. Two sisters spent Christmas week in Texas, and brought back at least 20 samples of plants, all labeled, when they returned.

2. A brother and sister spent the holidays in Florida near the coast and brought a large can with sea weed and live fiddler crabs, also some Spanish moss and leaves of various trees and shrubs.

3. One sophomore collected and labeled limestone fossils during the summer and gave a talk to the science club based upon his study after school started.

4. A butterfly collection of 30 different species, mounted and labeled, was begun preceeding school and continued during the fall."-- Westport High School, Kansas City, Missouri.

"Pupils have experimented with grafting and cross-polination at home; a few boys have brought in scrap-books they have made at home; one boy has started to study species of insects damaging wood of trees and has learned to classify insects; several have inexpensive microscopes with which they examine water and forms of life."-- Beverly, Massachusetts, High School.

"Several of our students have acquired small microscopes this year and are doing some very definite work with protozoa study and pond scum.

Some are making splendid butterfly and moth collections, others flower herbariums.

One girl is writing animal stories, one of which has already been accepted for publication."-- Union High School, Phoenix, Arizona.

"One boy made a large number of microscopic slides himself. Eight have home aquariums--some outstanding. One has turtles only--8 kinds."-- Chapman Technical High School, New London, Connecticut.

"Several continue the collecting, mounting, and classification work after our class-attention to this phase of the work has ceased. Silk worm culture at home. Many find an interest in caring for the silk worms and watching the complete metamorphosis."-- Jefferson High School, Lafayette, Indiana.

"One group of boys obtained a college zoology book and are doing some very nice dissections and drawings. Others are remodeling their home landscape, trading shrubs and flowers."-- Kenton, Hoio, High School.

"1. Six students brought their own microscopes and engaged in slide-making.
2. A few attended every lecture or demonstration of a Biological nature held in the city.
3. Individual visits to museums.
4. Insect collections, hikes.
5. Several students bought books, charts, test tubes, dissecting equipment, etc."-- Nashua, New Hampshire, High School.

"Student-initiated activities which have definitely tied up with Biology courses--
1. Raising goldfish.
2. Building outdoor pool and stocking it.
3. Taxidermy.
4. Raising tropical fish.
5. Collecting for and maintaining school aquarium.
6. Collecting insects in summer.
7. Turtle collecting for University museum.
8. Care and supplementing of biology class room museum.
9. Making of wall charts to illustrate life cycles, etc.,-- done by a girl with considerable artistic ability but little scientific ability. Has proved a very valuable addition."-- University of Michigan High School, Ann Arbor, Michigan.

Success as revealed by voluntary activities of former biology pupils.-- The following instances furnish more conclusive proof of the success of a biology teacher in guiding towards the worthy use of leisure because the activities described refer to those carried on voluntarily by persons who had completed the biology course in high school and a few by persons who had been out of high school for several years. Thus they represent examples of genuine carry-over value of the biological interests aroused during high-school days:

"Several instances are recorded of students who have continued the collection of the summer flora, not because required, but because they wished to do so."-- Roseburg, Oregon, Senior High School.

"One boy made a collection of various kinds of shells, (clams, etc.), found while making a tour of central and western states."-- Moscow, Idaho, High School.

"A former student learned taxidermy as a hobby. Another former student is now taking up landscape gardening as a hobby."-- Smith-Cotton High School, Sedalia, Missouri.

"A boy who took biology four or five years ago is still collecting seeds as a hobby, begun in biology at that time.

Two or three boys in the city are still spending all their spare time on bird hikes as a result of interest started in biology classes.

William Evans--two years out of high school--is planning a collecting trip down the Mississippi River and south to Bermuda.

Often students out of biology and out of high school come back after several years to ask about certain observations of birds, insects, flowers, etc."-- Central High School, Fort Wayne, Indiana.

"A number of our students have taken up for their life work some biological work as entomology, forestry, horticulture.

A considerable number are Scout Leaders and I find they emphasize biological and nature-study activities with their troops."-- Lawrence, Massachusetts, High School.

That such interests developed as hobbies may become vocational interests is clearly shown by the statement from Bennett High School, Buffalo, New York, as follows:

"a. Two girls became so expert in the use of the microscope that upon graduation they secured work in Health Department,-- work of microscopic nature-- and work involving culture raising. Their notebooks got them the job.

b. One boy secured work as 'boss' in city forestry department.

c. Another boy is one of the men in charge of the city 'Botanical Garden' workers.

d. Several girls and boys received summer jobs as 'nature guides'-- in Scout and similar camps.

e. As 'pin money' a boy raises aquaria plants."

CHAPTER V

SUMMARY OF FINDINGS AND CONCLUSIONS

Status for the United States as a Whole

Summary of the status of leisure teaching through biology courses.-- Only one-fourth of all the schools supplying data for the study claim to have an organized plan for leisure instruction as a part of the biology course. Written comments of teachers indicate that most of the plans are very brief and few are at all specific. However here and there a teacher is giving thought to the problem and striving to evolve a definite plan for utilizing the biology work for leisure guidance.

In approximately two-thirds of the schools the biology teachers have some knowledge as to whether or not the leisure habits of their pupils improve during the course. In most cases this knowledge is meager and based upon scattered observations of such activities of pupils as chance to come to the attention of the teacher. Only six per cent indicate that they use so widely-applicable a method as a questionnaire at the beginning and end of the course to detect improvement in leisure habits of pupils.

More teachers believe that leisure-time teaching is a

minor objective than consider it to be of major importance (44 per cent favor the former as compared to 37 per cent for the latter). No teacher went so far as to affirm that leisure guidance is unworthy of any consideration. A few teachers indicate that their views on this matter are changing to favor leisure guidance as a major objective of the biology course in secondary schools.

Only 3 per cent of the schools require every pupil to study biology. Somewhat more than a third require it for at least one curriculum group in the school. Hence nearly two-thirds of the schools do not require it for any pupils whatsoever. Written comments, however, show that the popularity of biology as a subject of study renders its requirement unnecessary in a few instances at least.

To summarize; in most of the schools there is next to no plan for leisure guidance, teacher knowledge of leisure habits of pupils is superficial, leisure guidance is deemed of importance in only a third of the schools, and two-thirds do not require biology at all. Such a situation upholds the writer's previous statement that the majority of secondary-school teachers including administrators and biology teachers do not fully appreciate the significance of leisure to society. Hence attempts toward using existing secondary-school subjects for leisure guidance have as a rule been sporadic and indecisive. In contrast, there is a far-sighted minority of biology teachers who are making genuine efforts to meet the

challenge of education for the worthy use of leisure and whose embryonic struggles must eventually achieve a measure of success.

Regardless of teachers' motives, nearly all of those replying encourage pupils to try new and more worth-while ways of spending leisure time as nearly all allow credit for at least one type of voluntary supplementary work. Three-fourths allow credit for at least three types of such work. As intimated in Chapter III, most of the teachers carrying out this procedure are probably not motivated primarily by a desire to achieve effective leisure guidance. Furthermore, if only one pupil voluntarily engaged in a certain type of supplementary work during the entire school year the teacher would be justified in checking that type of work on the list. Thus the indication is in keeping with the concept that most biology teachers are doing but little in the way of leisure education as compared to what they might accomplish.

The most significant result of the written comments in connection with the items on voluntary supplementary work of pupils is the list of additional types of such work which the biology teacher may suggest to his pupils, together with the list of ways in which recognition may be given to encourage pupils to engage in such leisure pursuits.

Nearly nine-tenths of the schools allow a higher grade for the term for successful completion of one or more voluntary projects. The degree of allowance is small as a rule.

It seems desirable to limit such credit so that it will be an inducement but nothing more. As far as possible, pupils should be brought to realize that their best reward is to be found in the joy of having accomplished something worth-while. Although other inducements are listed, that of offering a higher grade for the term seems to be most readily applicable, as well as most often utilized by teachers.

Assuming that pupils are most apt to engage in activities which most strongly appeal to them, then it follows that schools which utilize practices and equipment which help in arousing pupils in worth-while activities are achieving the best leisure education. Therefore it is well to see how extensively biology teachers are using such means.

Approximately four-fifths of the teachers devote time to the discussion of current events of biological import. The same number plan their work with the definite aim of arousing interest. In only slightly more than one-fourth of the schools does the text book used contain a section on biology for leisure. Three-fifths devote time to motivation of voluntary nature study. These figures are only qualitative and yield no information as to the amount of time devoted to such leisure-guidance activities during the year. Hence one can conclude only that some teachers make use of these methods and that most of them could make much greater use of a larger number.

The comments are important chiefly for suggesting other procedures for arousing the interest of pupils in matters bio-

logical. Also the writer is led to believe that some teachers at least have conceived the idea that an important measure of the success of a high school biology course lies in the extent to which deep abiding interests have been developed in pupils.

Some effort has been made to utilize the biology course as a means of developing in pupils a desire to use the leisure of their summer vacation to better advantage. It is difficult to say just how effective such efforts are. The information from the checking list discloses merely that nearly half the schools report that some time is devoted in class before school closes to the discussion and planring of summer activities. One-third of the schools try to check in September on the vacation activities of pupils as an added inducement for pupils to pursue some worth-while activity during the summer months. Here again it is apparent that much more might be done by teachers along this line which would be time and effort well spent.

In regard to adjuncts to the biology class room which help to arouse interest and thus aid in leisure guidance, very few have either a greenhouse or conservatory for the use of the biology department (11 and 15 per cent respectively). It is probably that such facilities are available in a very much smaller percentage of all schools in the United States including those which did not supply data for this study.

A high percentage (84 per cent) of schools maintain bulletin boards of one sort or another and renew contents at

widely differing intervals of time. Nearly nine-tenths of the schools maintain an aquarium in the class room, over three-fourths keep potted plants, more than half have a museum, the same number maintain a terrarium, and about one-third have a vivarium. In connection with each of the above-mentioned adjuncts the written comments are enlightening as to ways for increasing the value of each.

The importance of visual aids in arousing interest in biological science can hardly be over-estimated. However, the initial cost of many such aids is so great that the majority of schools make little or no use of them. Practically one-half of the schools supplying data make no use at all of motion pictures in biology classes. As the average for all schools supplying data is six reels of motions pictures shown in each biology class during the year, it is apparent that for those schools which have projectors, the average number used is much higher.

About two-fifths make no use of lantern slides but some of these use film strips instead. On the average, 161 slides per school are available for use in biology classes but this does not present the actual situation as a few schools in large systems have over one thousand available. No data were obtained concerning other types of visual aids.

Living specimens of plants and animals may appeal to all of the five special senses and hence constitute the most valuable aids for stimulating the interests of pupils. The res-

ponses to these items on the checking list revealed that the great majority of biology teachers appreciate the value of living specimens as teaching aids and contrive to have many brought into their class rooms.

Table 19 will be helpful to the teacher who is examining biology text books with the intention of introducing one in his classes, for it discloses the relative popularity of 23 different text books. This table also reveals the proportion of schools using a given text book in which the teachers consider that the book treats leisure-time biology at all adequately. Only three books are reported as treating this phase adequately in the opinion of at least half the teachers using each book. On the average, one-fourth of the schools report that the text book used treats biology for leisure adequately, that is,,as well as might be expected. However, over four-fifths of all the schools report that it is necessary to supplement the text in this respect.

In regard to supplementary reading-material, the most significant information is gleaned from the written comments. Most teachers appear to realize the desirability of supplementary material but many have concerned themselves but little with this form of biological exploration. Some teachers require a certain amount of such reading, others strongly urge but do not compel pupils to do any. Several noteworthy suggestions are included in regard to ways of increasing the available supply of reading material.

Additional comments by teachers indicate that they have

followed other procedures with the intention of developing better leisure habits on the part of biology students. These include enrolling in courses in nature study, revision of courses of study, reduction of required work and increase in voluntary work, making the course more practical, and conducting more extracurriculum activities for pupils. Further comments list activities pertaining to pupils primarily which have contributed to the formation of desirable leisure habits.

Summary of the status of leisure guidance through biological extracurriculum activities.-- More than two-fifths of the schools report that practically no leisure guidance goes on outside of the class room whereas only four per cent conduct all of it outside the class room. In only one-fourth of the schools is at least half of the leisure guidance extracurricular. It seems to the writer that some phases of leisure guidance should be conducted in the class room and some outside of it, but just how much should be done in class and how much outside is subject to debate. Several teachers commented that the teaching load is too excessive to permit them to direct any extracurriculum activities.

Table 21 shows the types of club activities sponsored by biology departments in the order of frequency. Table 22 gives the types of places visited under the leadership of biology teachers in order of frequency also. On the average each school conducts one such visit a year. Table 23 shows that field trips for observation and collection are much more

popular with teachers. As a whole the schools, supplying data average more than two such field trips sponsored per school per year. Table 24 is valuable chiefly to indicate possible types of extracurriculum activities which teachers may suggest to pupils.

Extracurriculum activities in general are conducted as frequently during school hours as after school according to the replies to items on the checking list. Only half as many are carried out on Saturdays and one-fifth as many during vacations. On the whole the number of extracurriculum activities sponsored by biology departments is so low that it bears out the finding that only a small part of the leisure guidance is extracurricular.

As a measure of the success of efforts at leisure guidance there is scarcely a better criterion than knowledge of the actual extent to which pupils accept leisure pursuits opened to them during the biology course. Comments of teachers reveal many specific instances where pupils have gone on to engage in biological activities on their own initiative. That these pursuits have occasionally led to genuine hobbies is shown by examples cited where teachers know of the activities of former pupils. As to how wide-spread this carry-over is and what proportion of a given teacher's pupils it represents cannot be stated at all accurately.

Status of Leisure Guidance through
Biology in Certain Types of Schools

Summary for certain geographical areas.-- All of the re-

sponses to items on the checking list were tabulated according to the geographical area in which each school is located. This was done in order to bring out significant similarities or differences between schools in different sections of the United States in regard to the use made of biology courses for leisure guidance. Table 27 reveals the relative standing of schools in each of the five areas of the United States when ranked on each of 31 items in the checking list.

In ranking the areas on each item, that area given first place is the one in which the average for all schools in the area shows the most progressive tendency to use biology as a medium for leisure guidance. Conversly, the fifth and last place has been given to the area in which the average shows it to be most backward with respect to the item in question. No one item has been used to indicate the progressiveness or backwardness of a given area in regard to guidance in the worthy use of leisure through the biology course. Hence, although the validity of any and all items taken singly may be debatable as bases for commending or condemning the schools of different areas, nevertheless when taken as a whole it is probable that a reasonably accurate picture of the situation is obtained. The results appear to be more valid when one considers that the schools surveyed represent a selected group recommended as having outstanding biology departments.

By inspection of Table 27 the reader will perceive that the schools in the Middle Atlantic area show an overwhelming superiority to all others, having taken practically two and

Table 27

Numbers of ranks on certain items of schools in the same and different geographical areas

Rankings	Total numbers of ranks out of thirty-one items averaged according to location of schools in the same and different geographical areas				
	New England	Middle Atlantic	Southern	Middle Western	Western
First places*	2**	17	7	4	1
Second places	3	9	2	12	4
Third places	6	3	6	9	8
Fourth places	11	2	2	1	8
Fifth places	9	0	7	5	10
	iv	i	iii	ii	iv
Numbers of schools on which rankings are based	25	25	20	41	23

* Where two areas are tied for first place, both are rated as achieving a first place.

** Read as follows: 25 schools in the New England area averaged first or best on 2 out of 31 items.

one-half times as many first places as any other area, and rate second in the number of second places. On no item did they rank lowest. This may be accounted for in part, at least, by the fact that 60 per cent of the schools in this area are in the group of largest schools whereas no other area has more than half that percentage in this size-group as reference to Table 1 will indicate.

It may be of significance to the reader to know that 5 out of the 6 New England states are represented in this survey, 4 out of 5 Middle Atlantic (plus the District of Columbia), 8 out of 13 Southern, 11 out of 13 Middle Western, and but 6 out of 11 states in the Western area. Moreover, the state generally accepted as having the most progressive schools in the Western area is represented by but 2 schools whereas the state recognized as being one of the least progressive educationally in this area contains the abnormally large proportion of 6 schools out of the 23 in the Western area supplying data for this study.

With these facts in mind, it is the writer's opinion, based on the showing of each geographical area in this study as a whole, that the order of ranking is approximately as follows:

First - Middle Atlantic
Second - Middle Western
Third - Southern
Fourth -(Western
-(New England

Obviously, there is so little difference between the Western and New England areas in rankings that the writer does not believe that either can justifiably be placed in fifth or low-

est position.

Summary for schools having certain types of organization.- The tabulation of responses to checking-list items according to the type of organization of each school discloses no significant difference between reorganized schools and those retaining the regular four-year type of high school. Table 28 shows that the latter type ranked first on 16 items whereas the reorganized schools averaged first on 13. Interesting though not significant is the fact that unclassified schools ranked lowest on twenty of the thirty-one items.

The schools having the regular type of organization led the others in respect to having:

1. The most schools which claim to have an organized plan for leisure guidance.
2. The most schools which make use of ways for discovering improvement in leisure habits of pupils.
3. The most schools which consider leisure guidance a major objective of the biology course.
4. The most schools which require biology of pupils.
5. The most schools in which the best balance exists between leisure guidance in the class room and out of it.
6. The fewest schools in which leisure guidance is entirely extracurricular.
7. Academic credit for voluntary supplementary work allowed most often.
8. The most schools which devote time in class to discussion of biological current events.
9. The greatest average number per school of extracurriculum activities sponsored by biology department.
10. The greatest average number per school of visits to institutions sponsored by biology department.

Table 28

Numbers of ranks on certain items in the checking list for schools having the same and different types of organization and sizes of average grade enrollment

Rankings	Total numbers of ranks out of thirty-one items averaged by schools having the same ard different:					
	Types of Organization			Sizes of Average Grade enrollment		
	Regular	Reorganized	Unclassified	195 or fewer	196 to 390	391 or more
First places	16*	13	5	6	7	20
Second places	9	15	6	6	19	8
Third places	6	3	20	19	5	3
Numbers of schools on which rankings are based.	50	71	13	40	41	40

* Read as follows - 50 schools having the regular type of organization averaged first or best on 16 out of 31 items.

11. The greatest average number per school of activities other than field trips sponsored by biology department.

12. The greatest average number per school of class room accessories maintained in active condition.

13. The greatest average number of lantern slides per school available for use in biology class rooms.

14. The greatest average number of supplementary biological reading books per pupil per school.

The regular and reorganized schools were exactly tied for first place with respect to having the largest number of schools which devote time in class to motivation of voluntary nature study, and in having the most schools which claim to have knowledge of the improvement of leisure habits of pupils.

The reorganized schools led the others in respect to having:

1. The most schools which grant a higher grade for the term for voluntary supplementary work.

2. The most schools which plan class work with the definite aim of arousing interest.

3. The greatest number of schools in which the biology department sponsors one or more extracurriculum activities.

4. The greatest average number per school of nature walks sponsored by the biology department.

5. The greatest average number of activities per school conducted by the biology department to arouse interest in worth-while vacation activities.

6. The highest percentage of schools with a greenhouse for use of the biology department.

7. The highest percentage of schools with a conservatory connected with the biology class room.

8. The highest percentage of schools with both a greenhouse and a conservatory.

9. The greatest average number per school of reels of motion

pictures used in biology classes.

10. The greatest average number per school of species of animals brought into the biology class alive.

11. The greatest average number per school of types of plants brought into the biology class.

Examination of the list of points in which each type is superior does not reveal any significant correlation between methods, procedures, equipment, point of view, or extracurriculum activities with either type of organization. The only conclusion tenable on the basis of the data herein presented is that reorganized schools are no better nor worse than regular types in so far as each is concerned with progressiveness in utilizing biology courses for leisure guidance.

Summary for schools having different sizes of average grade enrollment.-- Analysis of the responses to checking-list items when tabulated according to size reveals very decisive differences between the three size-groups. As may be seen in Table 28, the schools having an average grade enrollment of 391 or more ranked first on 20 out of 31 items which is nearly 3 times as great a frequency as is shown by the group of medium-sized schools and more than 3 times the frequency of the smaller-sized group. The medium-sized group has 19 second places and the smaller-sized group rates the same number of third places. Thus it is evident that size of school correlated decisively with progressiveness in utilizing the biology course as a medium for guidance in the worthy use of leisure. This fact is probably the most significant single revelation of this

study as it is so conclusively demonstrated.

Several factors probably contribute to the superiority of the larger-sized schools in this respect. Among them are:

1. A greater degree of specialization is possible. In the smaller schools, biology ordinarily represents but one of two, three, four or even five different subjects which a given teacher is carrying. Not until the average grade enrollment approaches 391 (the lower limit of the larger-sized group) is it usual to find a teacher devoting all his time and effort to the single subject of biology.

2. A greater amount of money per pupil is apt to be available for purchase of equipment, apparatus, books, and other supplies for use in biology class rooms.

3. The more highly trained and experienced teachers are likely found in the larger school systems whereas the smaller schools must accept inexperienced persons with less formal training to fill vacancies. The less forward-looking teachers as a rule tend to stay in the smaller systems while the more progressive gradually enter larger schools where the remuneration is greater.

Of significance to teachers in the smaller-sized schools (average grade enrollments of 195 or fewer) are the items in which this group ranked first. The list follows:

1. Requiring biology most often.
2. Giving academic credit for voluntary supplementary work most often.
3. Devoting time to motivation of voluntary nature study

most often.

4. Having greatest average number of supplementary biology reading-books per pupil per school.

The schools within this size limit were tied with those in the largest size limit as a group for first place in respect to:

1. Showing the best balance between leisure guidance in class and out of class.

2. Having the fewest schools in which practically all leisure guidance is extracurricular.

The larger schools show a distinct superiority over the smaller schools in regard to better equipment, more extensive extracurriculum activities, and greater use made of materials available for the enrichment of the biology course.

CHAPTER VI

INFERENCES AND RECOMMENDATIONS *

Attitudes

Teacher attitudes-- If a teacher is to guide pupils successfully toward better use of leisure time he must first of all be convinced of the worth-whileness of such effort. Most people are incapable of retaining more than one or two major objectives in their minds at once. As a result, the objectives which seem of least importance to the teacher are soonest dropped from consideration, unconsciously perhaps, but not less completely. Hence the teacher who desires above all else to instill in his pupils a love for things biological is far more apt to succeed in leisure guidance than the teacher who is most of all concerned with teaching his pupils the details of physiological processes, anatomical structures, or scientific classifications. It is difficult to conceive of successful leisure guidance resulting from a course taught by a teacher imbued with the idea that his biology course has been a success even though his pupils walk out of the class room in June firmly resolving never more to have dealings with anything suggestive of biology. The writer has emerged with such a

*In this chapter the writer has gone beyond the findings of this study and presents inferences which lack complete proof as they are based largely upon opinion. To a great extent the writer has drawn upon his own experience as a teacher of biology as a basis for the recommendations included in this chapter.

feeling from courses he has studied in secondary school and not until compelled to explore those fields again on the collegiate level did he dream that they might be actually interesting. Moreover the writer has had the experience repeatedly of meeting persons who on learning that he was a teacher of biology, ventured the information that once they had studied biology and disliked it. After years passed the only impression left was one of distaste for biology as a subject of study.

On the other hand, the course has gone a long way toward successful leisure guidance which has been so developed that at its conclusion pupils leave the class room with a definite feeling of regret. To leave such a feeling in the minds of pupils it is necessary for the teacher to make his course appeal to boys and girls as being worth-while. Questionnaires submitted by the writer to pupils in his courses at the close of each school year for several years have revealed a high degree of correlation between the popularity and the worthwhileness of a course in the eyes of pupils.

With these ideas in mind, consider the types of teacher attitude represented by the following descriptions. One teacher concerns himself with the continual improvement of his course to meet the needs and interests of pupils, and to eliminate the least important requirements which destroy pupil enthusiasm (eg. learning technical names of bones in the human body, or the orders of insects, or types of leaf margins.) His goal is to create in his pupils a desire to continue deeper and deeper into the realm of biological science.

Another teacher concerns himself with the continual improvement of his course to meet college-entrance requirements more completely, and have his pupils achieve a higher norm each year on a certain standardized biology test. His goal is to give his pupils a thorough knowledge of biological facts, principles, and techniques.

The writer is not in a position to state which of these types of goals is the more worthy, but he does maintain that the attitude of the teacher toward these goals will determine more than any other single factor which goal is more nearly attainted. The acceptance of one goal does not in itself mean that the other goal will receive no consideration, for it is possible for a teacher to devote attention to both objectives equally. However, examination of Table 7 shows that in only 37 per cent of the schools replying is leisure guidance considered as a major objective of the biology course and leisure guidance is far more closely related to the goal of arousing enthusiasm for biology than it is to inculcating knowledge to the former objective to the exclusion of the latter but rather that teachers should give it equal importance.

Furthermore, it is the writer's conviction that until teachers as a group take the attitude that a goal of major importance is the creation of a desire to go on and on with the subject, then just that long will the courses in secondary schools fail to guide pupils successfully in the worthy use of leisure.

Another attitude which the biology teacher should culti-

vate is a willingness to experiment. Such experimentation will reveal to the discerning teacher weaknesses and strong points in his procedures. Imagination to devise other ways of doing things to secure better results is necessary. One must not expect to achieve perfection at once but rather strive to make his course each year better than the previous year. Chance in method is not always improvement and judgment is needed to maintain a proper balance between innovation and well-tried procedure. Above all else, enthusiasm for youth and its enrichment, and faith in the fundamental value of biology as a subject of study for life enrichment are essential attitudes for the teacher who would really draw out the best that is in his pupils.

Pupil attitudes.-- Pupils differ in their attitudes toward what is worth-while in a biology course. All pupils are not interested in all phases of the science as the course progresses from week to week. However, it is possible to lead most pupils to become interested in most of the work and some of them to become interested in all of the work. A very few may become intensely enthusiastic about one or more phases of biology. Matters which impress the freshman or sophomore as being of great moment frequently hold no interest for the junior or senior. Scientific discoveries which seem very worth-while to boys offer no appeal to girls. Pupils having a high degree of intelligence can see value in the discussion of biological principles which are meaningless to duller pupils. Pupils whose background of experience has been limited become bored by re-

ferences to seashore, farms, or forests which arouse keen interest among pupils who have visited such places. The boy who has worked on a farm appreciates references to weed and insect pests, to germination of seeds, to propogation of plants, which are meaningless to boys who never have worked in such a place.

Hence, it becomes the task of the teacher who would impress his pupils with the worth-whileness of biology, to develop the course so as to arouse an attitude of enthusiasm for the science on the part of boys and girls having such divergent previous interests. For many, if not most of the pupils, the first course in biology opens a great number of new avenues for exploration and widens horizons to regions heretofore nonexistent for them. The teacher who wishes to guide pupils to use leisure worthily must strive to have these new experiences leave his pupils with a feeling of pleasure.

As has been pointed out (see page 20), attitudes abide long after factual details have faded from memory. Hence the greater emphasis should be placed upon the types of attitudes developed than upon the factual knowledge learned. Facts and figures are not to be deprecated or overlooked but must not be considered as being the all-important objective but rather as the means of achieving an end. One cannot appreciate the importance of the balance in nature as a biological principle until he has become acquainted with specific illustrations of man's interference with nature's balance. Nor can a pupil appreciate the value of biological discoveries relating to the control of bacteria until he learns facts concerning these

organisms and the historical background of their conquest. An attitude of racial tolerance is more likely to come with a knowledge of racial similarities as well as racial differences. A more wholesome attitude toward reproduction as a normal vital process common to all living things should grow out of the study of reproductive processes of organisms.

At least one biology text-book lists objectives to be attained from each unit of work at the beginning of the unit and definitely divides them into two groups. The first set of objectives consists of facts and principles to be learned and the second contains a statement of attitudes which the authors expect will develop in pupils as they study the unit. 1/

Habits are closely related to attitudes and appreciations in having carry-on value in leisure guidance. For instance, formation of the habit of reading current scientific magazines surely possesses leisure-guidance value and is an outgrowth of a developed appreciation of the pleasure to be derived from reading such literature. Similarly, a habit of neatness and orderliness in keeping notes may be traced to the attitude of desiring to be neat and orderly as opposed to a tolerance for disorderliness and slovenliness. An attitude of kindness and thoughtfulness toward dumb animals may result in a habit of treating them kindly and must be based upon an appreciation of their sensitivity to unkind treatment. The study of alcohol

1/Arthur O. Baker and Lewis H. Mills, Dynamic Biology, Rand McNally and Company, New York, 1933, pp.2, 62, 94.

and other narcotics will be of little value unless it results in resolution on the part of pupils to refrain from their use.

Every teacher will do well to evaluate his own course in terms of attitudes, habits, appreciations, concepts, opinions, impressions, and resolutions formed by pupils as a result of the study of certain units of the work and eventually from the whole course. The teacher must be alert to discern the out-cropping of unsuspected and undesired attitudes if he is to forestall them. The writer once found that such an unforeseen impression had been created during the discussion of sanitation when he discovered that some pupils had concluded that the sanitary precautions advocated were useless because "people never had any trouble even though they did not carry out these precautions." To correct such impressions the writer cited instances where epidemics occurred as a result of the lack of public health measures. The presentation of but one side of a question is apt to form undesirable attitudes. The extermination of wild life in America is rather a doleful topic which may leave pupils depressed if it stops there, but not if accompanied with pracitcal suggestions for relieving the situation.

Exaggeration to impress pupils with the results of using narcotics will seldom change attitudes of tolerance for such use. The boy who sees about him men who habitually use alcohol is not greatly impressed by statements as to what may eventually happen to him if he tries it. In fact it is more apt to arouse in him an antagonism toward the teacher. An unbiased discussion more often corrects the false impression held.

Dogmatic assertion or arbitrary condemnation of practices repugnant to the teacher seldom wins a pupil to alter his opinion but a reasoned discussion often will change his attitude for the better.

Motivation.-- The creation of a desire to perform assignments or to take part in subject matter discussion, is all based on the fundamental principle of leisure guidance that people do willingly the things that to them seem most worth-while or most interesting at the time. Again it is the teacher's task to present the topic in such a way as to make it appear of great importance and value. This will tax the teacher's initiative and imagination but will save the teacher the very considerable drudgery later of trying to compel pupils to perform an experiment, to pay attention, to study an assignment, or to participate in discussion. In other words, motivation is the technique of a leader rather than of a driver.

Any portion of the course which the teacher finds very difficult or impossible to justify in his own mind as being important should be discarded and the time devoted to other work more easily justified. It is as inadvisable to include phases of a biology course which appeal only to pupils as to include such topics as seem worth-while only to teachers. It is better to subject all class work and outside assignments to the criterion that each must appear worth-while to both pupils and teacher. It this be done, then the creation of enthusiasm for the course, that is, motivation, will prove to be a far simpler problem. Conversely, every time a required lesson in

biology appeals to pupils as being a waste of their time and energy, then just so much less does the course become effective as a medium for guidance in the worthy use of leisure.

Because a teacher deliberately attempts to arouse an attitude of interest and enthusiasm for the study of biology from day to day, it does not follow necessarily that the teacher is lowering standards or coddling his pupils. All things need not be disagreeable to be beneficial and minds may be disciplined as thoroughly by studying subject matter which seems worth-while to those minds as by studying lessons which are entirely unrelated to their interests and needs.

The writer does not advocate that courses be made easy instead of difficult but rather that they be made to seem worth-while instead of meaningless to pupils. The writer has noted instances where pupils have worked diligently and willingly to complete difficult assignments which appealed to them as being worth-while when on other occasions the same pupils incompletely performed assignments requiring far less time but which held no significance for them. Probably no teacher ever will develop a course wherein all assignments will appear worth-while to all his pupils. However, every teacher who is willing to make a beginning can slowly increase the percentage of such assignments. With such improvement in the character of required assignments will come a corresponding increase in the effectiveness of that biology course for leisure guidance.

The concept that motivation is not peculiar to the objective of leisure guidance alone but is fundamental to all

learning, is sustained by Morrison when he states:

> The major elements in the learning situation are motivation and attention.---- Students of the educative process---- recognize the principle that no real learning takes place apart from that sense of value which is commonly called 'interest'.---- It frequently arouses in the individual willing devotion to toil and hardship and sometimes to experiences which are in themselves the reverse of pleasurable....
>
> The course which an individual's learning will take when he has been released from the constraint of the schoolroom will depend upon the character and extent of his genuine interests. If he has acquired no sustaining interests, the teaching to which he has been exposed will have failed in its principal objective.... 1/

Summary of inferences and recommendations regarding attitudes.-- The writer believes that the following considerations are essential for the success of any biology course as a medium for leisure guidance:

1. The teacher must be convinced of the worth-whileness of efforts toward leisure guidance.

2. The teacher must be willing to try new methods and procedures from time to time.

3. The teacher must realize that attitudes and impressions abide much longer than factual information and hence are of greater importance than memorization of facts which are but the tools for developing attitudes.

4. A course is popular with pupils in direct proportion to the degree it impresses them as being a worth-while subject of study.

5. Pupils differ in their backgrounds of experiences as bases for appreciating the significance of subject matter to themselves.

6. The widening of pupil horizons is of prime importance in effective leisure guidance.

7. Teacher-tolerance of pupil-viewpoint breeds pupil-

1/Henry C. Morrison, The Practice of Teaching in the Secondary School, The University of Chicago Press, Chicago, 1926, pp.103-104.

tolerance for teacher-viewpoint, i.e., avoid dogmatism, exaggeration, impatience, and arbitrary cordemnation.

8. People undertake willingly the activities which to them seem most interesting or worth-while at the moment.

9. Class work and home work should appear justifiable to both teacher and pupils.

10. A course may be popular with pupils and at the same time require serious effort and diligent study commensurate with the abilities of the pupils involved.

11. If the pupil "has acquired no sustaining interests, the teaching to which he has been exposed will have failed in its principal objective."

ORGANIZATION OF THE BIOLOGY COURSE

Preparation of the course of study.-- Much confusion exists among biology teachers as to what the major objectives are, what subject matter should be selected, and how the course should be organized. Beauchamp states for science teaching (including biology) that, "in general, the courses of study are not based upon an adequate and clear-cut theory of education. This is suggested by a lack of uniformity in organization and content in individual courses, which indicates that principles of organization and criteria for the selection of materials of instruction have not been formulated." 1/

The writer's experience in working with groups of teachers to prepare or revise courses of study bears out the view that biology teachers have no generally accepted idea of what con-

1/ Wilbur L. Beauchamp, Monograph No. 22, Instruction in Science, Bulletin, 1932, No. 17, National Survey of Secondary Education, Office of Education, U.S. D. I. Washington, D. C. P. 61.

stitutes a proper procedure for formulating a course of study. Beauchamp believes that this is largely due to lack of a general viewpoint toward the teaching of science and failure to take into account "neither the contributions of the subject to the general aims of education nor the psychological and pedagogical considerations..." 1/

Examination of biology text-books designed for high school use discloses the lack of agreement among experienced biology teachers as to how a course of study should be organized, for a text-book is the outgrowth of a course of study. One book begins with an introduction followed by several chapters on plant structures, another begins immediately with a unit on food-getting animals, a third book has a section on insects as the first major unit of work. Still another text-book begins with taxonomy and another with ecology.

Confronted by such a situation, there is little wonder that biology teachers are apt to have a feeling of being "lost in the woods" and find security of mind in teaching the text-book as they find it, with little attempt to find their way out of the confusion of conflicting methods and procedures.

Objectives of biology teaching.-- The writer feels that teachers need to formulate a philosophy of education for themselves. Furthermore, this philosophy should be translated into a concrete statement of objectives for the biology course.

One of the first steps for the teacher to take in clarifying his own ideas concerning a course of study in biology is

1/ibid. p. 61

to formulate for himself a set of objectives which to him seem valid. The teacher may begin by writing out a list of benefits which he hopes his pupils may derive from studying biology with him. Some of these results probably will be general in nature and some very specific. Some will pertain to the acquisition of knowledge, some to the development of attitudes, and some to other outcomes. In any event, it is a first step toward crystallizing one's opinions regarding the purposes for which one is teaching biology.

Next comes the evaluation and classification of the different objectives outlined. The teacher may consult reports of authoritative committees, prefaces of biology text-books, and books by recognized leaders in the field of curriculum building. (A list of sources of such information is contained in the bibliography in the Appendix to this thesis.)

Beauchamp 1/ suggests a classification of objectives into six groups while Baker and Mills 2/ divide them into but two groups and include a list of objectives at the beginning of each unit in the course.

Beauchamp warns that "little importance should be attached to the frequency (in different courses of study) of objectives" and further states that "so far as the writer knows there is at the present time no conclusive method of evaluating the objectives (of science teaching in general)." 3/

1/ibid. p. 10
2/op. cit. pp. 2, 62, and 146
3/op. cit. p. 13

The novice at curriculum building may become discouraged again by this seeming lack of unity among authorities on science teaching (including biology) and abandon further attempt to extricate himself. On the other hand he may be heartened to find that there is a basis for justifying any set of well-considered objectives which he or his committee may formulate.

As the writer sees it there are two distinct attitudes reflected in lists of objectives formulated by educators for the guidance of biology teachers. One attitude is that of the subject specialist who teaches biology chiefly for the sake of inculcating biological information and developing skill in biological laboratory procedure. This point of view is represented perhaps by the college professors of biology who construct the entrance examinations and place little or no emphasis upon attitudes and appreciations. Such a viewpoint of necessity affects the secondary-school teacher of biology who must cause his pupils to assimilate as many biological facts and principles as possible so that they can glibly respond to any and all possible questions which ever have been or ever may be asked of the prospective college freshman. Likewise the authors of text-books intended for the use of biology pupils in secondary schools must write with an eye to the fulfulment of college-entrance requirements, else the demand for their product is limited greatly.

The other viewpoint is that of the educator who sees his subject as one of many included in the high school program to

educate, literally, the pupils in that school. He looks upon biology as a tool, as a means to an end, and not as an end in itself. He attempts to teach his subject chiefly for the sake of developing more worthy ideals, attitudes, appreciations, habits, and interests in his pupils. Biological facts and principles are but the vehicles for carrying out his vision of better behavior on the part of his pupils. This attitude is represented perhaps by the college professor who leaves his stamp longest upon his students, whose utterances are the most frequently discussed in fraternity houses, and whose opinion carries greatest weight with alumni. This man is invariably a master of his subject, a real scholar, and a man of considerable experience and culture. His courses are among the most difficult of any in the college.

The high school teacher of biology will find the implications of the second of these two points of view the most difficult to follow consistently, especially in the early years of his teaching experience. The outcomes of teaching to inculcate knowledge are more readily and objectively measured than are the less-tangible results of teaching to improve behavior, that is, to mould character.

Regardless of the list of formal objectives set up for the guidance of the biology teacher, the relative degree of effort expended to fulfil each of the stated objectives will depend more upon the point of view of the individual teacher than on any other single factor. The teacher whose ideal is to have his pupils acquire a fund of biological facts is less

apt to accomplish real training in the worthy use of leisure than is the teacher whose ideal is to bring about an improvement in the attitudes and appreciations of pupils as reflected in improved behavior. This improved behavior may show in more worthy home membership, better behavior on the street, at play, at work, in short, anywhere and everywhere; during leisure hours or otherwise.

As has been stated previously, there is no conclusive method for evaluating objectives for the teaching of biology. The value of formulating a list of objectives lies chiefly in the clarification of the teacher's own ideas during the process of developing and expressing the more or less vague aims teachers are apt to entertain before such thinking is provoked. Hence, no completed set of objectives, however carefully devised by authorities on biology teaching is as valuable to a teacher as a list drawn by himself. Ideas must be digested and assimilated as thoroughly as food before becoming useful to an individual. Statements of objectives copied verbatim from books written by someone else are apt to repose unused in the teacher's desk. Self-made lists of objectives affect a teacher's work more fully because they represent his own effort and probably coincide with his usual practices more closely.

The writer has assumed that the teacher is about to build or reorganize his own course of study without attempting to follow exactly any particular biology text-book. The writer believes that such a procedure will result in a more complete

achievement of guidance in the worthy use of leisure. The very act of evaluating aims affects the viewpoints of teachers so engaged for the first time so that, unconsciously perhaps, the broader attitude of teaching biology for culture rather than teaching biology for biology's sake will eventuate.

Guiding principles in organizing the biology course.--

Having formulated the objectives of the biology course the next step is to determine the general principles to function in the selection and organization of materials of instruction. Beauchamp [1] found that very few courses of study examined for the National Survey of Secondary Education contained any statement concerning the guiding principle followed in organizing science courses. He suggests that teachers refer to studies which have been made in regard to building science curricula in order to understand more fully the basic principles of organization.

Many biology text-books contain in the preface statements of principles of organization considered by the authors in constructing their respective books. Outstanding examples are those submitted by Pieper, Beauchamp, and Frank; [2] Baker and Mills; [3] Meier and Meier. [4] Without such a set of concrete

1/op. cit. p. 15

2/Charles J. Pieper, Wilbur L. Beauchamp, and Orlin D. Frank, Everyday Problems in Biology, Scott, Foresman and Company, Chicago, 1932, pp. v - x

3/op. cit. pp. vii - ix.

4/W. H. D. Meier and Lois Meier, Essentials of Biology, Ginn and Company, Boston, 1931, p. iii.

principles to guide the teacher, his course is apt to be poorly organized from the standpoint of unity and coherence. For example, the placement of topics may be either haphazard or carefully decided in the light of definitely established criteria.

In organizing his own course in biology the writer has considered the following guiding principles:

I. The subject matter is to be as practical and worth-while for pupils to study as is possible.

II. To be worth-while and have practical application the subject matter must deal directly with the activities of pupils.

III. The normal activities of pupils (and of adults) may be classified as follows:

1-Home activities (household, filial, parental)
2-Personal well-being activities (mental, physical, emotional)
3-Leisure-time activities (recreation, play, amusement)
4-Intercommunicational activities (social, language, transportational)
5-Citizenship activities (local, state, national, international)
6-Vocational activities (labor, business, professional)
7-Educational activities (cultural, developmental, training)
8-Religious activities (devotional, ethical, moral)

IV. All subject matter not pertinent to one or more of these activities is to be discarded.

V. Subject matter pertaining to the greatest number of activities is to be stressed mostly and that pertinent to the smallest number is to receive the least emphasis.

VI. Subject matter which functions most often in the daily activities of pupils will abide longest with them and will sustain their interest as a subject of study longest.

VII. The inclusion of a topic in any biology text-book is not in itself a valid reason for including the topic in the course of study to be constructed. Conversely, the

exclusion of a topic from any or all biology text-books is not prima facie evidence that the topic is to be left out of the course of study.

VIII. Subject matter is to be arranged in units capable of providing the greatest degree of functional value insofar as such value can be determined. For example, rather than a topic on "bones and muscles of the human body," the subject would be introduced as "How the human body moves." Rather than topic on "leaves," the problem would be stated "How do plants make food?" If the topic is biological in scope and is capable of improving worth-while pupil activities by contributing to a better understanding by the pupil of his environment then its inclusion is justifiable.

IX. The ability to use science as a method of reasoning is as worthy an outcome of a biology course as is the understanding of biological principles. Subject matter is to be selected and presented in a manner calculated to develop capacity to reason scientifically.

Types of organization of biology courses.-- In general, two different schemes are in use for the organization of biology courses. One is far more common than the other and is the traditional type of course. It is perhaps the logical outgrowth of the union of separate courses in botany, zoology, and human physiology into a single course called biology. Beauchamp 1/ found that this method of organization is used in 40 out of 45 courses of study analyzed. According to this viewpoint, "the objectives of biology can be attained through a detailed study of the various plants and animals," 1/ and of the human body.

The second plan of organization builds the course around a study of the activities and processes of living things rather than upon a descriptive account of living things. Beauchamp states that this type of organization emphasizes similarities

1/op. cit. p. 32

of living things while the former plan stresses their dissimilarities. He favors the second point of view which is to determine the units or topics of the course on the basis of answer to this question, "What are the fundamental life processes and activities of living things toward which an individual should have an intelligent attitude?" 1/ However, Beauchamp concludes that although recent opinion tends to support this latter viewpoint, "there is no evidence to indicate that one method of organization is superior to the other," and that it is possible to arrive at an understanding of biological principles by either method." 2/

The writer became so interested in the possibilities of teaching biology according to the second plan that he reorganized his entire course of study on that basis for the school year of 1935-1936. Previously he had taught biology according to the plant-animal-human physiology framework. By reorganizing, the writer hoped to gain the advantage of focusing the attention of pupils more fully on acquiring a functional understanding of principles and ideas rather than upon words, names, and phrases. Pupils, especially the slower groups, object strongly to learning many strange names. They prefer to use familiar words to describe structures and their interest is greater when they are permitted to do this. It is difficult to avoid the use of technical names in describing plants and animals, but it is possible to eliminate them in many cases or

1/ibid. p. 34
2/ibid. p. 35

to introduce only one or two new words at a time.

With the emphasis upon life processes rather than upon a description of structures, habits, and importance of particular species of animals or particular organs of plants such as roots, stems, and leaves, it seemed reasonable that it would be easier to stress ideas rather than words. With this accomplished, the writer thought it possible to make the course as a whole appear to be of greater worth in the eyes of pupils, hence of greater interest to them, and thus of greater carry-over value in their own activities of all types, including leisure-time pursuits.

If one accepts Morrison's definition of a learning unit as "a comprehensive and significant aspect of the environment, or of an organized science, capable of being understood rather than capable merely of being remembered," 1/ then it becomes the duty of the teacher of biology to organize his course around units which seem to him to meet this criterion. A unit is comprehensive if it explains a great deal about the environment and significant if it is important and essential for the pupil to understand (not merely to "know"). The writer believes that life processes and activities of living things are more significant and comprehensive aspects of the pupils' environment than are particular species of animals or particular structures of plants.

One objection to the organization of biology courses on the basis of life functions is the fact that organs or systems of

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1/op. cit. p. 182

organs do not exist independently. Rather, they are parts of animals and to find them we must study the whole animals. For example, one does not find the digestive system of a fish except in a fish and when one finds these organs he discovers others also. Therefore it is better to study all the organs of a fish one after the other. This is especially true for laboratory dissection.

However valid this objection may be for the study of animal functions, the fact remains that under the traditional plan of organization of biology courses, plants are studied according to their roots, stems, leaves, and flowers without holding to one species only to illustrate all structures. For example, the carrot may serve as the laboratory specimen of a root, the bean as a typical seed, the nasturtium as a typical flower, and the horsechestnut to illustrate the adaptations of a twig in winter. Often no reference is made whatsoever to the other structures which compose that particular species besides the one in question.

With reference to human biology, it is virtually the universal practice to organize the work on the basis of systems of organs and their functions. The digestive system is studied as a series of related topics and likewise the nervous system and sense organs. Circulation, respiration, excretion, and nutrition in the human body ordinarily are treated as separate topics in biology courses of study and text-books.

The writer sees an almost unescapable improvement in the conception obtained by the pupil of the universality of vital

processes from an organization of biology which treats such functions as common to all plants, animals, and man as well. He believes that such units are more "capable of being understood rather than capable merely of being remembered." Understandings abide and carry over into out-of-school and post-school activities whereas memorized facts do not.

On the other hand as a result of teaching his course when organized wholly on a basis of vital-function units the writer has come to the conclusion that at some place in the course, time should be devoted to the study of animals and plants as individual organisms. Such a unit presented early in the course acquaints the pupils with particular species which may be used later for reference in studying life processes. Moreover, the whole organism is an entity more easily grasped at first than an organ or a system of organs.

An interest in nature is an important leisure guidance objective of biology, yet nature study is scarcely feasible on any basis other than one of making living plants and animals the center of attention as individuals or as species.

Although this plan is perhaps a compromise between the two distinct types of organization of biology courses, it is nevertheless a very workable scheme. It has been incorporated successfully in at least one text-book [1] in which one unit out of nine in all is devoted to the study of plants and animals as such.

Selection of subject matter.-- The next logical step is

1/ op. cit. 692 pp. + xxv.

the selection of subject matter in the light of the objectives and guiding principles which have been determined upon as criteria. With these ideas in mind, the writer has organized his course in biology on the basis of six comprehensive units as follows:

I- The nature of life and living things.

II- How living things effect human welfare

III- How living things obtain and use the energy necessary for life.

IV- How living things respond to conditions of their environment.

V- How life on earth continues.

VI- How biology has become a science.

This plan of organization has been in use in some of the classes in biology in Framingham High School during the year 1936-1937. It has been followed for both college preparatory and non-college or applied biology classes with some difference in emphasis in each case.

Any biology teacher should not hesitate to outline units for his course which are different from the majority of plans in use, for as Billett states it, "One's best judgment is the sole criterion for deciding what the units of a given subject shall be----." 1/

Biological science includes so many different fields of research, many of which are distinct and well-organized sciences

1/Roy O. Billett, Monograph 13, Bulletin 1932, No. 17, Provisions for Individual Differences, Marking and Promotion, National Survey of Secondary Education, p. 243.

in themselves, that an introductory course in biology must be confined to a study of the more important phases of the science. Biological principles are the same the world over but the practical applications of these principles vary with the locality. Hence the emphasis placed upon each topic or problem under the different units treated in the course will differ with the geographical area.

Another factor to consider in selecting subject matter, especially for the inexperienced teacher, is the basic text-book which must be used. Economy of time in the learning process is enhanced by the aid of a text-book and even the experienced teacher will find himself handicapped if his selection of subject matter diverges too widely from the content of text-books available to his pupils.

The arrangment of the subject matter ought to be determined by definite factors. Again, the inexperienced teacher will find it difficult to do otherwise than follow the plan of the text-book in use in the school. Unless he has the benefit of advice from an experienced teacher it probably is better to conform to some well-considered plan as represented by any text-book than to experiment during one's first teaching year.

The advent of the seasons of the year is an important factor in determining the sequence of units because during the winter season, especially, living specimens of animal and plant life are difficult to procure in most localities.

The relative difficulty of the different units is worthy of consideration in arranging their sequence. In other words,

psychological characteristics of the learner are of as much consequence as the logical demands of the subject. Beauchamp believes that too much emphasis has been placed upon the determination of subject matter content with too little regard to "the difficulty of these materials to pupils at different levels of maturity." 1/

Another important point to consider in selecting subject matter is the extent to which biological science has been included in the junior high school curriculum. When all pupils enrolled for the biology course have received the same background in junior high school science courses, then this becomes a relatively simple task. However, when the pupils studying biology come from different junior high schools where different courses of study are in use, then the problem is more difficult of solution. It may be complicated still more by the fact that pupils in different curriculum groups have received different numbers of years of general science instruction ranging from none at all up to some in each of grades seven, eight, and nine.

It is seldom feasible to solve the administrative difficulties of separating these pupils according to their backgrounds of science instruction. Hence the biology teacher must overcome the problem as best he can. One method is to select subject matter on the basis that no pupil has studied any phase of biology previously, then less time is given to topics which

1/op. cit. p. 38.

the teacher finds are familiar already to the majority of his pupils as the course progresses.

Another factor which affects the background of pupils and the difficulty of subject matter for the pupils to master is the grade level of the majority of pupils enrolled. The writer has found the learning situation more ideal where all pupils in a given class are in the same grade level. The writer has taught classes in biology which included pupils showing a wide range of background and ability. In one class in particular were both boys and girls; tenth, eleventh, and twelfth grade pupils, pupils in five different curriculum groups (manual arts, household arts, commercial general, and college preparatory). Also, in this class, a boy who had scored highest in his grade on a group test of mental ability sat beside a boy who scored lowest in his grade on the same test. Some pupils had studied general science one year, some two; one pupil was studying physics, and two others were studying chemistry at that time; at least eight different nationality backgrounds were represented. One pupil was repeating the course. A more heterogeneous group the writer has never been obliged to teach.

This factor of heterogeneity impinges upon leisure guidance because subject matter which is too difficult for pupils to comprehend stifles interest, does not seem worthwhile to them, and hence has no carry-over value into leisure time. The same is true where the content is too easy to present any stimulus to learning.

TEACHING PROCEDURES

Assignments.-- The writer has drawn a few conclusions regarding assignments on the basis of his own experience. In the first place, detailed assignments are particularly helpful to pupils who are slow to learn. An assignment which is not outlined for or by the pupil in writing at the time it is given is of very little help to the pupil. A mere reading assignment unaccompanied by a list of guiding questions provides no definite goal for the pupil to achieve. To state the situation another way, an assignment to read a given number of pages "to find out what the book says" about a given topic will produce almost as many different conceptions as there are pupils performing the assignment. The writer has found this to be true for the greater number of senior high school pupils. Still better results are obtained where the pupil is required to express answers to the guiding questions in writing.

In building his course of study for biology the writer has divided each of the units into problems, the mastery of which will contribute to an understanding of the major units. When about to begin the study of a new problem, the writer provides each pupil with a mimeographed sheet on which the problem is stated in question form and which contains a list of topics for investigation and discussion to bring about the mastery of the problem. This outline also includes a list of references bearing on the problem and a series of "pupil activities." The latter take the form of one or more assignments to be completed

within one or more days. Usually some voluntary activities are suggested as well.

The required activities are in the nature of reading assignments accompanied by a list of guiding questions to be answered, or occasionally diagrams to be drawn in the note-book. Such assignments refer to the basic text in use whenever practicable, or if not, then to one of the text-books in the school library and of which enough copies are available to supply all pupils who can be seated in the library at one time.

Required assignments are constructed with the end in view of having each contribute to mastery of the problem confronting the pupil. Assignments for the sake of something to take up the pupil's time are avoided in so far as is possible. In this way the writer hopes to develop and maintain in his pupils a feeling that they are required to work out only assignments which are reasonably worth-while in the sense that they lead to better understanding of the problem before them.

Nothing is more stultifying to interest than the consciousness that what one is required to do is meaningless and unimportant. Thus there is a close connection between assignments which seem worth-while to the pupil and the effectiveness of the course in leisure guidance.

Testing the learning product.-- The writer has found it difficult but not impossible to construct tests which measure more than memorization of facts. Beauchamp finds that of the tests he examined in visiting schools, "for the most part they

are tests of the ability of pupils to remember facts." 1/ In making out tests, teachers should remember that pupils strive to learn the type of material teachers ask for on tests. The learning of technical terms which are of no significance to pupils destroys their interest and enthusiasm for biology as a subject of study and hence defeats the leisure guidance objective.

Provision for individual differences.-- There are many worthy ways of spending leisure time and different ways naturally appeal to different persons. Hence guidance for leisure implies that provision be made for individual differences.

It has been stated already that extra credit may be given for a number of supplementary activities on a voluntary basis to encourage the exploration of new ways to spend one's leisure. Pupils may be required to try certain types of activities once or twice simply to bring them to attempt these activities but any extensive endeavors solely for purposes of leisure guidance must be voluntary.

For example, it is justifiable to require all pupils to read some articles in the National Geographic Magazine or the Nature Magazine to acquaint them with these sources of biological information for recreational reading. However, it would be questionable procedure to require all pupils to read any particular article in one of these publications solely for its leisure-guidance value.

Likewise, it may be justifiable to require pupils to do

1/op. cit. p. 58.

some sort of soap carving or clay modeling of a biological sub-subject but not to specify exactly what the subject is to be in order to receive credit. The idea is not to develop skill alone nor to increase biological knowledge alone but rather to cause pupils to engage in new lines of recreational endeavor.

In all fairness to pupils, credit must be given when such exploratory activities are required. The writer believes that extra credit or other means of recognition, however slight, ought to be allowed for any worthy voluntary supplementary activity of an exploratory nature which is completed as a result of encouragement given by the biology teacher. Negative recognition may take the form of demerits against pupils who fail to complete any of the suggested voluntary activities.

Activities suggested for their leisure guidance value.-- A biology course very properly may be the medium for suggesting new ways for pupils to spend their leisure time. There are certain relatively worth-while leisure-time activities which may well be outgrowths of the study of biology. Pupil participation in such activities may be suggested to pupils and rewarded by additional credit. Such participation may even be required on the basis of exploratory experiences for it is possible to cultivate incipient interests and tastes. A partial list of such activities as are generally applicable for all pupils follows:

1. Reading for pleasure of articles pertaining to biology in periodicals such as the National Geographic Magazine, Nature Magazine, Reader's Digest, Survey-Graphic, News-Week, Life, Literary Digest, Popular Science Monthly, Popular Mechanics, Country Gentleman, Our American Forests, Ladies' Home Journal, Hygeia, Harper's, Saturday Evening Post, Collier's Weekly, Good

Housekeeping, etc.

2. Walking or hiking for pleasure which is enhanced by observations of trees, flowers, birds, insects, mollusks, mammals, reptiles, and other forms of wild life.

3. Discussing observations, readings, discoveries, improvements, applications, and other phenomena in the field of biological science with other interested persons as a pleasurable pastime.

4. Listening to radio broadcasts, platform lectures, and other talks by speakers on subjects pertaining to biology, especially its nature study and human health phases.

5. Visiting museums of natural history, zoological and botannical gardens, aquariums, and other collections of biological specimens open to the public.

6. Visiting, preferably for extended periods, national parks, forests, and monuments, as well as similar areas maintained at public expense by state and local governments for the preservation of wild life and of other features.

7. Visiting game refuges, bird sanctuaries, forest reserves, fish hatcheries, and other areas maintained by private agencies and individuals for the protection of wild life.

8. Visiting flower shows, live stock exhibits, fairs, dog shows, circus menageries, sportsmen's shows, rodeos, horse shows, and other exhibitions of a similar type operated for profit. The objection to attendance at such features is the fact that so many of them are so highly commercialized that undesirable attractions are frequently included. However, much of interest and value to the person interested in biology is included usually.

9. Visiting lakes, streams, seashore, swamps, marshes, bogs, reservoirs, and the like to observe and enjoy the living and non-living features abounding there.

10. Collecting and preserving specimens of fungi, flowers, leaves, mosses, ferns, seeds, mollusks, butterflies, moths, and other insects for pleasure.

The above-mentioned activities should be made meaningful by a study of biology and without such a study would have far less significance to boys and girls. Surely the possibilities for arousing deep abiding interests through the cultivation of such

worth-while leisure-time activities constitute a fundamentally important goal for any teacher to attain.

Laboratory experiments and demonstrations.-- As Beauchamp states the situation, "The war is apparently still raging concerning the problem of lecture demonstration versus individual pupil experimentation." 1/ The viewpoint one takes with regard to the importance of the different objectives of science teaching as a whole will influence one's opinion concerning this problem. If one believes that developing skill on the part of all pupils to use the microscope is an important objective of a course in biology, then one can justify the expenditure of class time for such training. On the other hand, if one feels that most of his pupils never will be required to make use of a microscope, then the use of the microscope for demonstration only is the logical procedure to follow.

One factor of considerable importance is the amount of money available to purchase materials and equipment for use of pupils in biology laboratory experimentation. Certainly the per pupil cost of demonstrations is far less than that of individual pupil experimentation.

The teacher must always face facts as they exist and do the best he can with the facilities which are available to him. The writer has been faced with the problem of teaching biology in a regular class room without any laboratory facilities in the room except a table with a gas jet. Consequently, for several years, the experimental phase of biology in the writer's

1/op. cit. p. 53

classes consisted almost entirely in demonstrations by the teacher or pupils.

From a leisure-guidance standpoint, laboratory experiments must be considered from their potential value in arousing interest in activities which may possess avocational possibilities. This aim of providing exploratory experiences in the field of leisure-time pursuits sometimes may be met best by demonstration, and sometimes by individual pupil experimentation. Where little skill or equipment is required in performing the activity, then demonstration alone may suffice, after which pupils can attempt the activity using their own ingenuity outside of class as a voluntary or required assignment. Such activities as mounting insects collected, making herbaria, drawing plant and animal structures, or germinating seeds perhaps may be considered in this group as they possess avocational interest for some pupils but not for all.

Teachers do not agree as to what constitutes an "experiment" in biology. To some teachers, a drawing done during class time is an experiment whether the drawing was made from a specimen or copied from a book or the blackboard. To others, an experiment is worthy of being called such only if it discloses facts which permit the pupil to draw a conclusion at its end. Still other teachers consider that any activity carried on by pupils during class is an experiment. With such divergent concepts it is difficult to set an hard and fast rule for conducting "experiments" in the biology class room.

The biology club affords an opportunity to gratify the

desire of pupils to experiment for themselves with microscopes and other apparatus under the guidance of the teacher to a degree which time does not permit or justify during the regular schedule of classes.

TEACHING AIDS

Note-books.-- Note-books help in the development of the leisure-guidance aim of the biology course if they are used in the nature of scrap-books wherein pupils may mount clippings and pictures related to phases of biology in which each is interested. This does not exclude the value of a note-book for other purposes such as that of recording notes on experiments and class discussions, or recording details of assignments when given.

Some pupils enjoy drawing diagrams and will use their note-books for so doing as an avocational pursuit. The writer believes that it is advisable to encourage pupils to do this if they have any talent along that line but as a purely voluntary activity.

Text and reference books.-- Text-books which are devised to appeal to pupils undoubtedly possess value toward leisure-guidance as does anything which increases the interest of pupils in biology as a subject of study. It is of equal importance to obtain a text-book which is written so that the pupils who are to use it can read it with understanding.

A few biology text-books intended for use in high schools have been prepared with an eye to leisure guidance very definitely. Outstanding examples which have come to the writer's

attention are those written by Curtis, Caldwell, and Sherman; [1] and Baker and Mills. [2]

Other authors have written biology text-books which the teacher may find equally useful for the purpose of leisure-guidance. However, the others have not so definitely committed themselves to the leisure guidance objective nor have they incorporated leisure guidance material to such an extent as an integral part of their text-book.

Reference-books are extremely useful in permitting pupils to explore more deeply the different fields of activity connected with biological science. Such reading is a recreation in itself for some pupils. Furthermore it may lead some of them to a desire to engage avocationally in the biological pursuits described therein.

The writer urges biology teachers to acquire reference-books for the use of their pupils whenever they can. Money should not be invested in reference-books which the teacher has not examined personally because titles are deceptive. Where funds do not permit the purchase of biology reference-books for the school or department library, arrangements may be made usually with public libraries for the latter to purchase a few books designated by the biology teacher. These books may then be reserved for the use of high school biology pupils for a period of time.

Most biology text-books include lists of suitable referenc-

1/op. cit. pp. 652-676

2/op. cit. pp. 402-487

books at the end of each chapter or unit or at the back of the book. Pieper, Beauchamp and Frank have included a very extensive list of references for additional reading by pupils in their text-book. 1/

Periodicals.-- Numerous popular magazines published weekly or monthly frequently contain articles which pertain to phases of biological science. Boys and girls patronize the news stands as often as they do the magazine section of the public library. Examination of the stock-in-trade of any news stand reveals the type of reading matter in greatest demand. Few people will uphold the value of publications such as "True Romances," "Wild West," "Movie Classic," "Dare Devil Aces," "True Confession," and their ilk as media for positive guidance in the worthy use of leisure.

On the other hand, to succeed in getting adolescents to abandon that type of reading matter it is necessary to offer a substitute therefor. Mere suggestion of the desirability of periodicals like the National Geographic Magazine, Hygeia, Nature Magazine, Country Life, or Readers Digest as better types of reading matter may be sufficient to improve the reading habits of a few pupils. However, to be really successful in inducing a majority of pupils to acquaint themselves with better periodical literature, it is necessary to require all pupils to undertake some sort of outside reading.

The writer has evolved a system which has met with a fair

1/op. cit. pp. 607-648

degree of success. Every pupil is required to read at least one article in a magazine each term. To check on this, pupils are required to choose an article before the middle of the term and to write out the title of the article together with the reference on a four-inch by six-inch card which is to be shown to the teacher as evidence of intent to fulfill the assignment. Then before the close of the marking period, the pupil reads the article chosen and writes a summary of his impressions of it in less than two hundred words.

The writer maintains a card index file containing nearly two hundred references to articles in periodicals which are on file in the school library or in the writer's personal collection. As new articles pertaining to phases of biological science appear in available publications, the writer includes the reference to it on a card which is added to the index file.

As the course progresses during the year, the writer invariably notes its guidance effect on the choice of topics for outside reading. At first the wide scattering of topics selected indicates that previously-developed interests determine the choice mostly. Later in the year, the topics chosen reflect a tendency to pick articles referring more directly to the subject matter most recently studied.

Further evidence of a leisure-guidance effect is deduced from the fact that less compulsion is needed to bring pupils to choose and read articles later in the year than at first. Also, the titles of articles chosen during the last two terms include a higher percentage which refer to topics requiring

some knowledge of biological science in order to appeal to a person. Moreover, in the latter half of the year more pupils request the privilege of presenting additional reading reports for credit than at first. All this has convinced the writer of the wholesome effect of this procedure so that he intends to continue and enlarge upon this aspect of his course in biology.

Visual aids.-- The teacher who is definitely trying to lead his pupils to develop an interest in biology will recognize the value of visual aids in so doing.

Moving pictures can portray biological phenomena which can be appreciated in no other way. With the use of time-lapse photography, the pupil can gain an appreciation of the continuity of many relatively slow processes during a single class period. However, the teacher must guard against the formation of incorrect concepts as to the actual time involved.

The use of sound-film moving pictures is a comparatively recent teaching device. Its possibilities, however, are so apparent already that teachers of biology will do well to keep themselves informed in regard to its development.

The cost of films is such an item that most teachers will find it necessary to avail themselves of sources of free films or of films which may be rented for a small fee. As a rule, the school must pay at least the cost of transportation of the film from and to the lending source. At least one biology text-book (Baker and Mills [1]) lists films which pertain to the

1/op. cit. pp. 61, 93, 144, 163, 207.

subject matter of each unit.

When the development of skill in the use of the microscope is not an objective of the biology course, the writer believes that the microprojector has far more value than individual microscopes as a teaching aid. The teacher can observe what he pupils see and at the same time can point to any part of the image on the screen so that pupils can readily perceive what the teacher wishes them to see. Movements of animalcules appear without distortion of their natural rate of speed which is not always true of motion pictures of the same organisms.

Prepared slides designed for use with a compound microscope show up well when projected through an equally powerful microscope onto a white screen. Hence, the writer believes that money expended on a good microprojector is more profitably invested than when used to purchase the number of individual compound microscopes needed to equip the ordinary high school biology laboratory.

Another highly desirable piece of equipment is a projection lantern equipped to project either lantern slides or opaque pictures and diagrams. The writer has found such a lantern to be of even greater utility than either the motion picture projector or the microprojector.

Lantern slides have their place as teaching aids and in time, a selection may be secured which will serve to illustrate portions of the class work perhaps better than any other medium. For example, colored slides are very useful in studies and tests

of identification of birds, flowers, and trees. Moreover, very acceptable and useful lantern slides can be made by pupils at little cost and with considerable enjoyment to pupils having talent in drawing.

The writer has built up a collection of diagrams, picture post cards, photographs from magazines, newspapers, and pamphlets, both colored and black-and-white. These are filed away and used in the projection lantern each year, especially during the study of insects, birds, forestry, bacteria, and conservation of wild life.

Film strips constitute a visual aid having a value comparable to that of a related series of lantern slides. One picture on the film is shown at a time and written descriptions or captions frequently precede pictures on the strip. The film strips may be used with a special projector which is less expensive than projection lantern.

Wall charts are readily obtainable and have the advantage that the room need not be darkened in order to use them. Moreover, pupils with talent for drawing can make enlarged copies of charts found in text-books at very little cost. The writer usually has from fifteen to twenty new charts made each year in this way by pupils who enjoy this work. Some of the charts are more useful to the writer than any which could be purchased from a supply house. Aside from their class room utility, the making of such charts in itself possesses leisure-guidance value.

Equipment and meterials in the laboratory or class room.--

The leisure-guidance aim of biology teaching can be furthered by the use in the laboratory or class room of certain types of equipment. For example, a bulletin board enables the teacher to display newspaper clippings describing current discoveries in the field of biology or events involving plants and animals. This helps to sustain interest in different topics long after attention to the topic as a subject of study has ceased.

A bulletin board made of soft fiber or cork is preferable to one of wood or cloth but that is not essential. The larger the bulletin board can be made, the more serviceable it will prove to be. It can also serve as a place to display charts, diagrams, drawings, and posters made by pupils for exhibition.

The contents of the bulletin board should be changed as frequently as the collection of new material will permit. The writer requires all pupils to bring in a newspaper item related to biological science or to plants or animals at least once during each term. In this way the attention of pupils is focused more fully on the intimate relationship of biology to everyday life.

Potted plants growing on window shelves or in an adjacent conservatory afford an ever-ready source of material for the demonstration of plant types and structures. This is particularly true if the different kinds of plants are selected with this objective in mind.

Any other appurtenances such as aquaria, terraria, museums,

or vivaria all add to the interest of pupils by helping to create a "biological atmosphere." That is, they help to induce a feeling on the part of pupils that the biology class room or laboratory is a place suitable for the study of living things, because one may expect to find living things there.

For the same reason, teachers should strive to have living specimens of a large number of different species of animals and plants brought into the class room during the spring and fall for observation. The animals, at least, should always be properly protected and never kept there for any length of time unless each is adequately provided with the necessities of its life.

The writer has been astonished often-times to find how few pupils are able to recognize and name specimens of common wild flowers or even flowers of plants commonly cultivated. The writer believes that the expenditure of some time in class is justifiable from the point of view of guidance to instruct pupils in the recognition of species of flowers which they are likely to encounter in woods, fields, parks, and gardens.

EXTRACURRICULUM ACTIVITIES

Clubs.-- Biology or nature-study clubs meeting apart from the regular schedule of classes afford a splendid opportunity for leisure guidance. As a rule, membership should be voluntary although attendance should be compulsory once the pupil has joined unless excused for good reason. Consequently, only pupils genuinely interested in the subject of biology will join.

The writer is sponsoring a biology club at present, membership in which is limited to pupils who have passed a high-school course in biology. With such a background, it has been possible to explore much further the phases of biology in which the members of the club have a special interest. The writer feels that by far the most valuable outcome that this club has or will have is its contribution to the guidance of its members in the worthy use of leisure.

As to the best time for holding meetings of clubs, that will vary according to the type of activity to be undertaken at the meeting. Some club programs may well be carried out within a club period during school hours. Others, such as a bird walk, may be conducted before school in the morning. Field trips sponsored by the biology club may take place in the afternoon after dismissal or in some instances on Saturdays or during vacation holidays.

Above all, the teacher sponsoring the club should keep in mind the fact that the greatest potential value of the club lies in the opportunities presented for guiding pupils into better ways of using their leisure time, in the future even more than at the moment.

Field trips.-- Although a teacher must guard against attempting to introduce activities into his teaching during any one year, nevertheless, addition of a few field trips has merit, especially for leisure guidance. These trips increase pupil interest in the course as well as having definite instructional

value. The teacher should plan field trips ahead of time as carefully as he would any other teaching procedure, otherwise undesirable outcomes may result. Moreover, groups of pupils out of doors need more careful supervision than when in the class room as there are more different things to distract their attention. Hence, successful teaching in the open requires a high degree of skill and resourcefulness on the part of the instructor.

The smaller the group which is taken on the field trip the more completely is the leisure-guidance aim of the trip apt to be realized. For some pupils, participation in field trips for the purpose of making collections or merely making observations may lead to a genuine leisure-time interest in such activities.

Extracurriculum activities for credit.-- In order to make fullest use of the possibilities of extracurriculum activities for avocational exploration, it is necessary to encourage pupils in every way possible into participation in such activities. For some pupils, a word of commendation or other expression of sympathetic interest by the teacher is sufficient encouragement. However, for many pupils a more tangible inducement is necessary.

The writer has found it helpful to promise, and later award, credit toward a higher grade for the term for every voluntary activity completed by pupils over and above the required work. The change made in the term grade is seldom more than 2 or 3 per cent yet in a few cases each term this means

the difference between a "C" and a "B" grade. In rare instances it has made the difference between a failing and a passing grade.

One may argue that crediting extracurriculum activities toward the term grade automatically destroys their extracurriculum status. Nevertheless, if activities such as drawing, collecting, dissecting, visiting, reporting, reading, building, observing, mounting, and modeling are carried on outside of school hourse voluntarily, then the writer believes that in reality they constitute extracurriculum activities. However this may be, the fact remains that voluntary participation in extracurriculum activities, whether in clubs or singly, provides excellent opportunities for avocational exploration. Hence, any reasonable means employed by the teacher to encourage pupils to participate in a wide variety of wholesome extracurriculum activities related to biology is justifiable of the basis of guidance in the worthy use of leisure.

GUIDANCE TECHNIQUE APPLIED TO LEISURE TIME-IMPROVEMENT

Checking interests and habits.-- Essential to all intelligent guidance is an adequate knowledge of the characteristics of the persons to be guided. Therefore, it is important for the teacher who would guide pupils in the worthy use of leisure to inform himself as best he can concerning the habits of using leisure which pupils have formed already.

Casual conversation with pupils, other teachers, and parents

will furnish some inkling in regard to the avocational interests and habits of individual pupils. Observations of pupil activities in and out of school by the teacher as well as notation of specimens and clippings brought into class by pupils will also afford insight into individual interests of pupils.

However, to really gain any precise information as to the ways pupils as a whole use their leisure time, more objective methods must be employed. Personal interviews with pupils consume more time than a class room teacher of biology can afford to give to this work. Examination of the record kept in the office of the participation of pupils in extracurriculum activitives related to biology may be of some help.

By far the most feasible plan from the standpoint of time consumed and results obtained is the questionnaire or checking list. The writer has used this procedure with pupils and finds that the most objective results are obtained by using a checking list. When the pupils fill out the checking list both at the beginning and the end of the school year, it is possible to measure the degree of improvement in the leisure interests of pupils and, presumably, of leisure habits.

Any teacher who has never tried this procedure will find it illuminating indeed if he gives some time and thought to the construction of the checking list. The writer has administered such a checking list to pupils when he has required each one to sign his name to the list and again when no names were included. No difference in frankness or sincerity of responses was noticed

either way.

Determining suitable leisure time activities.-- Of significance also is knowledge concerning the opportunities open to pupils to participate in more worthy leisure-time activities. The crying need of boys and girls is for information regarding avocational possibilities which they can avail themselves of here and now as well as in the future. Certain criteria should be considered in determining the suitability of pastimes for pupils to engage upon. The writer believes that the leisure-time activities toward which teachers may justifiably guide pupils should for the most part be activities which are:

1. Worthy, that is, which will develop the pupil physically, mentally, and normally.
2. Enjoyable
3. Accessible, that is, require little or no travelling to engage therein
4. Inexpensive
5. Capable of being participated in with a modicum of preparatory training or technical knowledge at least in the beginning.

For the most part, the teacher must gain his knowledge of the leisure-time activities suitable for his pupils through experience gained by living and working in the community where he is teaching. Interviews with pupils, other teachers, parents, scout leaders, and other persons in the community will reveal much along this line to the teacher who is a stranger to the locality. Excursions and field trips will yield first hand information in this respect.

Having determined the avocational interests and needs of pupils as well as the suitable leisure-time activities, the next problem is that of guiding pupils into these worth-while ways for using their leisure.

Several methods may be used, some of which have already been described. One effective procedure is the personal interview with pupils. As a rule, the biology teacher will not have time to interview more than a few pupils now and then during the year. Hence, methods should be employed which will affect the greatest number of pupils with the least expenditure of time and effort.

The writer makes a practice of devoting time in class at least once a month to the motivation through discussion of voluntary nature study and similar avocations. Previous to the summer vacation, at least one class period is given over to the discussion of possible pastimes for vacation days. This is accompanied by requiring every pupil to outline one or more leisure activities in which he plans to engage during the summer vacation. These plans are not necessarily limited to activities related to biology only. In September, the writer encourages pupils to bring in for exhibition any collections or projects completed during the summer.

The reader will perceive that the writer's efforts in leisure guidance consist for the most part in (1) suggesting possible avocational activities to pupils (2) encouraging pupils to participate in one or more of these activities, (3) providing

opportunities for such participation to pupils where possible and (4) organizing and conducting the course so that pupils may be led to a desire to explore further at least one of the different fields of biological science thus opened to them.

Summary of inferences and recommendations regarding leisure guidance.-- In the writer's opinion the contents of the foregoing pages may be summarized briefly as follows:

1. More people have more leisure time today than ever before.

2. The implications of leisure for individuals and for society are virtually unlimited, for good or ill.

3. Youth needs guidance in solving intelligently the problems involved in the worthy use of leisure.

4. A course in biology provides an excellent medium for teachers to guide pupils in the worthy use of leisure.

5. Teachers have not utilized this medium for leisure guidance at all completely, however.

6. Some teachers have exerted effort to use the biology course for leisureguidance, particularly in larger schools.

7. Such factors as:-
   (a) the attitudes of the teacher and pupils,
   (b) the organization of the biology course,
   (c) the subject matter included,
   (d) the methods, procedures, equipment, books, and other devices used in its presentation, all influence the effectiveness of the course as a medium for leisure guidance.

8. Extracurriculum activities related to biology furnish additional opportunities for leisure guidance.

9. Knowledge of the avocational interests and habits of pupils is necessary for successful leisure guidance.

10. To be effective for leisure guidance, the teacher

must utilize his course in biology to:-

(a) Suggest new and worth-while avocational activities to pupils,
(b) Encourage pupils to participate in one or more of these activities,
(c) Provide opportunities for pupils to engage in several of these activities, and
(d) Lead pupils to develop a deep and abiding interest in at least one of the different fields of biological science opened to them.

The teacher who can accomplish this final result will truly be using biology as a medium for guidance in the worthy use of leisure.

(Appendix)

Checking List on Biology for Leisure Time

Name of School _____

Name of person responding _____

Position of respondent in the school _____

Total enrollment of the school ____ Date of reply _____

Please encircle the grades included in your school:- 7 8 9 10 11 12

(Please encircle all "yes" and "no" answers, otherwise check.)

1. Have you an organized plan for instruction in the worthy use of leisure through biology? Yes No

2. Would you (with postage guaranteed) send an outline of your plan? Yes No

3. Would you (with postage guaranteed) send the outline of your course in biology? Yes No

4. Have you any way of knowing whether the leisure habits of your pupils have improved or not since starting this course? Yes No

5. If the answer to No. 4 is "yes" how did you find this out?
   ( ) 1. Questionnaire or checking list at beginning and end of course.
   ( ) 2. Personal interviews with pupils at beginning and end of course.
   ( ) 3. Reports on activities of pupils during vacations.
   ( ) 4. Personal observations out of school and in.
   ( ) 5. Reports from parents and other teachers.
   ( ) 6. Record of participation in related extracurriculam activities.
   ( ) 7. Specimens and clippings brought in by pupils.
   ( ) 8.(Specify other means) _____

6. In your biology course do you consider leisure-time education as:
   ( ) 1. A major objective of the course?

( ) 2. A minor objective of the course?
( ) 3. Incidental to other instruction?
( ) 4. Unworthy of consideration? (If this item is checked please explain why on the back of this sheet.)

7. In your school is biology required of all pupils in any curriculum? Yes No

8. If answer to No. 7 is "yes" please check which ones:

( ) 1. College Preparatory	( ) 6. Household Arts
( ) 2. Civic	( ) 7. Manual Arts
( ) 3. General	( ) 8. Scientific
( ) 4. Commercial	( ) 9. (Specify others)_____
( ) 5. Classical	( )10. _____

9. About what proportion of your leisure-time teaching is extra-curriculum, i.e., conducted outside of the classroom?

( ) 1. Practically none	( ) 4. About three-fourths
( ) 2. About one-fourth	( ) 5. All of it
( ) 3. About one-half	

10. Is academic credit given for voluntary supplementary work? Yes No

11. If answer to No. 10 is "yes" then what types of work are credited?

( ) 1. Outside reading from a list of approved books
( ) 2. Drawing diagrams
( ) 3. Making collections, (flowers, leaves, insects, ferns, etc.)
( ) 4. Making maps, charts, or graphs
( ) 5. Making cartoons or posters
( ) 6. Making clay models
( ) 7. Making a scrap book on biology
( ) 8. Building bird houses (or terraria, aquaria, etc.)
( ) 9. Nature photography
( )10. Taxidermy
( )11. Dissections
( )12. Reports of visits to museums (or zoos, parks, forests, etc.)
( )13. Building habitat exhibits
( )14. Keeping a nature calendar or diary
( )15. Reports on current newspaper or magazine articles
( )16. (Specify others) _____

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12. By what means is additional recognition given for voluntary supplementary work? (Please check)
( ) 1. No credit allowed at all
( ) 2. Credit toward graduation or school honors
( ) 3. Higher grade for term
( ) 4. (Specify other ways _____

13. What provision is made in the class-room work for leisure-time teaching?
( ) 1. Text-book used contains a section on biology for leisure.
( ) 2. Time is devoted to motivation of voluntary nature study
( ) 3. Time is devoted to discussion of current events of biological import or interest.
( ) 4. Class-work is planned with definite aim of arousing interest.
( ) 5. (Specify other methods) _____

14. Does your biology department sponsor any extra-curriculum activities during the year? Yes No

15. If answer to No. 15 is "yes" please check the type of activity sponsored during school hours in column "1"; those sponsored after school hours in column "2"; those on Saturdays in "3"; and those during vacations in "4":

A. Clubs	Column 1	2	3	4
(1) Agriculture				
(2) Anglers				
(3) Audubon				
(4) Bacteriology				
(5) Biology				
(6) Bird				
(7) Botany				
(8) Bee Keepers				
(9) Butterfly				
(10) Campcraft				
(11) Conservation				
(12) Dairy				
(13) Dissecting				
(14) Flower Gardening				
(15) Forestry				

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		Column 1	2	3	4
(16)	Friends of animals				
(17)	Hygiene				
(18)	Hobby				
(19)	Landscape				
(20)	Life Saving				
(21)	Live Stock				
(22)	Microscope				
(23)	Nature				
(24)	Pet				
(25)	Poultry				
(26)	Taxidermy				
(27)	Tropical Fish				
(28)	Vegetable Gardening				
(29)	Wild Life				
(30)	Wild Flower				
(31)	Zoology				
(32)	(Specify others)				

B. Visits to see:

(1)	Botanical Gardens				
(2)	Filtration plant				
(3)	State forest or park				
(4)	Creamery or dairy				
(5)	National forest or park				
(6)	Greenhouse				
(7)	Nurseries				
(8)	Museum				
(9)	Fish Hatchery				
(10)	Seashore				
(11)	Farm				
(12)	Zoological Garden				
(13)	Bird sanctuary				
(14)					

C. Walks or trips to:

(1)	See birds				
(2)	Collect ferns				
(3)	" flowers				
(4)	" fungi				
(5)	" insects				
(6)	" protozoa				

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		Column 1	2	3	4
(7)	Observe nature				
(8)					

D. Other extracurriculum activities:

(1)	Aquarium building				
(2)	Assembly programs				
(3)	Beautifying school grounds				
(4)	Camera hunting				
(5)	Clay modeling				
(6)	Hobby show				
(7)	Pet show				
(8)	Habitat exhibit				
(9)	Free nature lecture				
(10)	Speciman mounting				
(11)	Terrarium building				
(12)	Leaf printing				
(13)	Keeping scrapbook				
(14)	Maintaining bulletin board				
(15)	Making indoor gardens				
(16)	Making casts of animal tracks				
(17)					

16. Which of the following do you maintain in an active condition in your classroom?

( ) 1. Aquarium ( ) 4. Vivarium
( ) 2. Terrarium ( ) 5. Potted plants or window boxes
( ) 3. Museum ( ) 6. (Specify others) _____

17. Which of the following activities do you carry out to stimulate interest in worthy use of leisure during vacation?

( ) 1. Issue bulletins for vacation nature adventures
( ) 2. Devote time before school closes to discussing and outlining summer activities.
( ) 3. Devote time in September to exhibition or discussion of vacation activities.
( ) 4. Meet with groups of pupils during the summer occasionally.
( ) 5. Publish accounts in school paper or department bulletin of pupils' vacation experiences or

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activities.
( ) 6. (Specify others) _____

18. On the back of this sheet list definite instances where pupils have taken the initiative in leisure-time activities of a biological nature.

19. Do you have a school greenhouse? Yes No

20. Do you have a conservatory connected with the class room? Yes No

21. How many reels of motion pictures have you shown in each of your biology classes within 12 months?_____( )

22. How many steriopticon slides have you available for class room use? ( )

23. Do you maintain a bulletin board for biology? Yes No

24. If answer to No. 23 is "yes", then how often is the content renewed?
( ) 1. Every week
( ) 2. When work is started on a new unit or topic
( ) 3. About once in two weeks
( ) 4. At irregular intervals

25. Approximately how many supplementary reading books per student does your department library (or biology section of the school library) afford? _____( )

26. Please place in parentheses the approximate number of different species of live animals in any of the following groups brought into class within 12 months:

( ) a. mammals	( ) f.mollusks	( ) k. other insects
( ) b. birds	( ) g.crustaceans	( ) l. echinoderms
( ) c. reptiles	( ) h.arachnids	( ) m. coelenterates
( ) d. amphibians	( ) i,worms	( ) n. protozoa
( ) e. fish	( ) j.butterflies	( ) o. _____

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27. Please place in parentheses the approximate number of different species of plants (not dried or pressed) brought in to show types or modifications of each of the following structures:

( ) a. roots	( ) d. flowers	( ) g. spores
( ) b. leaves	( ) e. stems	( ) h. colonies
( ) c. seeds	( ) f. fruits	( ) i. _____

28. What textbook(s) are you using at present? _____

_____

29. Do you consider that biology for leisure-time is treated adequately in this text? Yes No

30. Do you find it necessary to supplement the text in this respect? Yes No

31. Would you care for a summary of this investigation? Yes No

32. What have you done within 12 months with the intention of developing better leisure-time habits in your biology students? (Please describe any phases of your work not covered in the foregoing items which bear on the subject of leisure-time. Use the back of one of these sheets.)

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